The Hope and Vision of J. Robert Oppenheimer

Michael A. Day

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To my wife Judy
for her love, inspiration and encouragement

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Preface

The development and military use of atomic weapons at the end of World War II not only destroyed two cities and their populations, but also created revolutionary changes and crises for scientific activity and the world at large. Due to these earth-shattering changes, scientists were called upon to address issues related to science and society as well as the significance of the atomic revolution for the international order and even humanity itself.

The public clamored to hear from its leading atomic scientists, and the scientists were eager to respond. For the public, these scientists offered more than a glimpse at the secrets of the atom. They were seen as interpreters of science and its new relationships to society, and as offering hope for transcending the atomic crisis. Perhaps this role was no better exemplified than by the physicist J. Robert Oppenheimer (1904–1967).

With the atomic attacks against Japan in August of 1945, Oppenheimer became a public symbol and interpreter of modern science, embodying both science and the atomic crisis. Lecturing throughout North America as well as South America, Europe, and Japan, Oppenheimer continued in this dual role until shortly before his death in 1967. His views and opinions were widely covered in the press and he made several appearances on radio (e.g., BBC Reith Lectures in 1953) and television (e.g., a one-hour program with Edward R. Murrow on CBS in 1955).[a]

[a]For an in-depth discussion of the Murrow interview of Oppenheimer, see Mark Wolverton, *A Life in Twilight: The Final Years of J. Robert Oppenheimer* (New York: St Martin's Press, 2008), Chapters 1 and 2.

Unfortunately, and in some ways understandably, Oppenheimer has now faded into insignificance and is seen primarily in symbolic roles — "Father of the Atomic Bomb," the "Atomic Faust," the guilt-ridden scientist who had "known sin," and the most prominent victim of McCarthyism. Oppenheimer has become a subject for the TV docudrama and even the opera. However, the question remains whether he offers something of value beyond the symbolic. A significant feature of this book is the construction of an extended argument which answers this question with a definite yes. Though not easy to establish, such an answer is not unexpected for Oppenheimer was a person of remarkable talents and genius who was strategically placed as a scientist, government adviser, and public intellectual.

But Oppenheimer is a subject surrounded by controversy and presents historians and biographers with numerous challenges. In this book, like others before me, I take up this "Oppenheimer challenge" and attempt to remove some of the mystery surrounding him. However, my overall approach is not easily categorized, so let me first say what I am *not* doing. I am not doing history, or even intellectual history, or philosophy, or biography in the traditional sense.

Instead, what I am doing in an overall sense might be called "philosophical biography," and it moves in two dimensions. First, I recover and reconstruct what Oppenheimer said during the 1940s, 50s, and 60s, which I identify as his hope and vision of 1957–59. With this in hand, Oppenheimer's various views and outlook become more understandable and, I would contend, more noteworthy. Further, questions are explored concerning what might be of interest from a general philosophical perspective.

Second, and just as important, I consider not only Oppenheimer's thought but also his life using philosophical ideas developed by contemporary philosophers, in particular, ideas developed by the British philosopher Bernard Williams (1929–2003) and the American philosopher Richard Rorty (1931–2007). Interestingly, connections arise between these two complementary dimensions that serve to illuminate and assess Oppenheimer and his thought. The key question, of course, is whether this overall approach is biographically, historically,

and philosophically grounded, and provides insight into Oppenheimer and his thought. I believe it does.

Central to any discussion of Oppenheimer and his thought, of course, is the atomic or nuclear revolution, and the possibility of transcending the resulting crisis. In order to deepen and broaden the discussion of Oppenheimer's vision as well as to further demonstrate its relevance for today, his thought is also analyzed using contemporary international relations theory with special emphasis on nuclear nonproliferation and disarmament. This inquiry, which is taken up in the last chapters of this book, proves instructive as well as illuminating, and resonates well with recent calls for "a world without nuclear weapons," such as the one made by US President Obama in Prague in 2009. This overall examination using contemporary international relations reveals a realism underlying Oppenheimer's thought that in many ways is prescient of the work being done today to control, and possibly transcend, the nuclear revolution.

In Chapter 1, I present a biographical sketch of Oppenheimer, and then turn to a discussion of recent scholarship and the so-called "Oppenheimer challenge." In Chapter 2, the development of Oppenheimer's views on science and society commences with his hope and vision of 1957–59. This hope and vision serves as a "vital center" both temporally and conceptually in developing Oppenheimer's thought. Chapters 3 and 4 focus on exchanges between Oppenheimer and the Pulitzer Prize-winning poet Archibald MacLeish in 1949 and the Nobel Prize-winning physicist I. I. Rabi in 1962, respectively. These exchanges furnish means, both temporally and conceptually, for a fuller and richer account of Oppenheimer's thought and its development.

Along with some historical background concerning attempts at the international control of atomic energy (e.g., Acheson–Lilienthal proposal), later chapters then place Oppenheimer's thought in a broad, and perhaps more revealing, philosophical light. In particular, moral ramifications for Oppenheimer of the failure of international control are explored. Connections are then made between Oppenheimer's thought and American pragmatism as well as what

philosophers and other social theorists have called "modernity" and its various crises. After this, an examination of his thought as well as Oppenheimer himself is undertaken using philosophical ideas and themes from Williams and Rorty. Finally, Oppenheimer's hope and vision as related to the nuclear revolution is placed within the context of contemporary international relations theory.

Before turning to the biographical sketch of Oppenheimer, I would like to say something about the journey behind this book. In 1997, with my training in physics and philosophy, I became interested in American Cold War physicists and their views on the nature of science and society. With Oppenheimer as "Father of the Atomic Bomb" and his papers nearby at the Library of Congress, I decided to focus my research on his views on the nature of science. I found the task fascinating, demanding, and at times frustrating.

After making some progress, I was fortunate in 1999 to meet and spend time with David Hawkins, who was a friend of Oppenheimer. Hawkins was trained as a philosopher and knew Oppenheimer at Berkeley during the 1930s and 40s. Further, Hawkins was an administrative assistant to Oppenheimer at Los Alamos and wrote the official technical history of the Los Alamos atomic bomb project. While discussing my work with Hawkins and, more important, listening to him, I began to realize that my approach to Oppenheimer and his thought had to be broadened.

In addition, Hawkins introduced me to Priscilla McMillan, who was then researching and writing her biography of Oppenheimer that was published in 2005. With encouragement and insights from Hawkins and McMillan, I was able to bring this first task, namely Oppenheimer's views on the nature of science, to completion. Clearly, I learned much about Oppenheimer from both Hawkins and McMillan. But more important, when I now look back, what I sensed in both of them was a definite sympathetic, though not uncritical, understanding of Oppenheimer based on reflection and firsthand experience or research. I must confess that my personal reactions to Oppenheimer at this time were for the most part ambivalent.

My efforts then turned to the physicist I. I. Rabi, whose papers were also at the Library of Congress, and the focus was on his views

on science and society. Rabi was a very close friend of Oppenheimer and a senior adviser to the atomic bomb project at Los Alamos. Again, I was fortunate. I met and interacted with the physicist and historian of science John Rigden, who knew Rabi and had written the definitive biography of Rabi. With Rigden's insights and encouragement, I was able to complete my work on Rabi.

With Oppenheimer's and Rabi's views along with some documentation of their interactions in hand, I noticed additional coherence and richness in Oppenheimer's thought. Then, in 2007, I began working with Gary Grieve-Carlson, a friend and colleague who specializes in American poetry. Our focus was the poet Archibald MacLeish and Oppenheimer, who were friends and exchanged ideas on Cold War America. From these investigations, again more coherence over time as well as in content appeared in Oppenheimer's thought and philosophical outlook.

During these years, I also had the opportunity to meet and talk with several Oppenheimer scholars — in particular David Cassidy, Charles Thorpe, Kai Bird, and Martin Sherwin. These interactions and the scholarly works of these individuals have proved invaluable in promoting a fuller and richer understanding of Oppenheimer. Furthermore, over the last few years, I have come to realize that Oppenheimer's thought and outlook touched on many of the themes and issues found in contemporary international relations theory — debates over realism/liberalism/constructivism, the role of epistemic communities, and issues concerning nuclear policy and nuclear disarmament.

Finally, by making connections to standard philosophical thought, like American pragmatism, and, in particular, the moral thought of the philosopher Bernard Williams, I came to conclusion that a convincing case could be made for a sympathetic, though not uncritical, understanding of both Oppenheimer and his thought. In other words, Hawkins and McMillan were insightful and justified in their overall assessments and reactions to Oppenheimer.

In this book, the reader will not only encounter Oppenheimer and his thought, but will also be taken on a journey with elements of history, science, philosophy, and international relations theory. Such is to be expected for Oppenheimer was a man of many dimensions as

well as a person of remarkable talents and genius who was strategically placed. The general thesis of this book is that Oppenheimer's thought is important, engaging, relevant, and more coherent than normally assumed, and hence his voice needs to be brought back into the public forum. Hopefully, this effort may contribute to a fuller, and perhaps more sympathetic, understanding of Robert Oppenheimer.

Acknowledgments

During the years of research and writing that underlie this book, I have accumulated a number of debts both professional and personal.

First, I am indebted to the late David Hawkins of the University of Colorado. David was and remains a paragon of inspiration, and was instrumental early on in pointing me in the right direction and shaping my interpretation of Oppenheimer and his thought. Second, Priscilla McMillan, Oppenheimer scholar and friend, has played a formative role in my understanding of Oppenheimer. Her enthusiasm and encouragement along with her research and scholarly work have proved invaluable.

John Rigden through his scholarly work, especially on the physicist I. I. Rabi, and his support over the years, has furnished me both understanding and opportunity. His commitment to a public understanding of science, as illustrated through his long-term editorship of *Physics in Perspective* along with Roger Stuewer, serves as a model of social and academic responsibility. In addition, for conversations and their scholarly works on Oppenheimer, I am grateful to David Cassidy, Charles Thorpe, Martin Sherwin, Kai Bird, and Mary Palevsky.

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Robert Carey, Rick Chamberlin and Stephen Williams as well as my physics colleagues Scott Walck and Barry Hurst for their comments, support, and encouragement. I must also call attention to my indebtedness to my friend Robert Hardy of the University of Nebraska–Lincoln, who was my physics mentor, for his insight, encouragement, and guidance over the years.

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Parts of this book borrow from previous publications. Material in Chapters 2 and 6 appeared previously in "Oppenheimer on the Nature of Science," *Centaurus* **43** (2001). Material in Chapter 3 appeared previously in "MacLeish, Oppenheimer, and 'The Conquest of America'" (coauthored with Gary Grieve-Carlson), *Soundings: An Interdisciplinary Journal* **93** (Fall/Winter 2010). Material in Chapter 4 appeared previously in "I. I. Rabi: The Two Cultures and the Universal Culture of Science," *Physics in Perspective* **6** (2004), and

in "Oppenheimer and Rabi: American Cold War Physicists as Public Intellectuals" in *The Atomic Bomb and American Society: New Perspectives* (Knoxville, TN: University of Tennessee Press, 2009). Material in Chapter 7 appeared previously in a book review of Jay A. Labinger and Harry Collins (editors) *The One Culture? A Conversation about Science* in *Physics in Perspective* **4** (2002).

Also, I thank Nancy Rabi Lichtenstein for permission to quote from the I. I. Rabi Papers at the Library of Congress.

Finally, any errors or omissions as well as deficiencies in this book are my responsibility.

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Chapter 1

Introduction

Biographical Sketch[1]

Robert Oppenheimer, the son of Julius and Ella (Friedman) Oppenheimer, was born in New York City on April 22, 1904. His father emigrated from Germany to the United States in 1888 at the age of 17, and became a very successful textile importer. His mother, born in Baltimore, had studied art in Europe and was an accomplished painter and teacher of art. Robert was raised in an atmosphere of culture and wealth — a spacious apartment on Riverside Drive overlooking the Hudson River with maids and a chauffer, a summer home on Long Island, family trips to Europe, and a 28-foot sloop for Robert about a year before his high school graduation. His younger brother Frank, who would also become a physicist, was born in 1912.

The Oppenheimers were an emancipated Jewish family who belonged to the Ethical Culture Society founded by Felix Adler in 1876. The Society was nonsectarian and emphasized moral dialogue and instruction with a commitment to charitable work and progressive social reform; that is, "Deed, not Creed." Robert's parents had been married by Adler and his father was a member of the board of trustees of the Society for a number of years.

From 1911 to 1921, Robert attended the Society's private school called the Ethical Culture School, located next to Central Park. Young Robert, delicate and physically awkward, excelled even relative to his gifted and motivated peers. Taken as distant and sometimes difficult by fellow students, he was precocious — an "adolescent

polymath."[2] Years later, Helen Rabi, who had attended school with Robert, "recalled that by the seventh grade he was universally recognized as an intellectual phenomenon."[3] In 1926, Helen married I. I. Rabi, who later became a close friend and colleague of Oppenheimer and won the 1944 Nobel Prize for Physics.

Robert had developed a scientific bent early on. In particular, he always felt indebted to his chemistry-physics teacher Augustus Klock, with whom he helped set up laboratory equipment and went on occasional field trips collecting minerals, "for having set him on the road to science."[4] But young Robert's life was a very sheltered one. Looking back years later, Oppenheimer recalled that "My life as a child did not prepare me in any way for the fact that there are cruel and bitter things."[5]

Robert graduated from the Ethical Culture School in the spring of 1921. That summer on a family trip to Germany, Robert contracted a life-threatening case of trench dysentery. He had to postpone his enrollment at Harvard University until the fall of 1922. In the summer of 1922, as part of his recuperation, he went on his first trip to the Southwest with Herbert Smith, his high school English teacher. Oppenheimer thoroughly enjoyed the adventure — fresh air, beautiful vistas, physical challenges — which afforded a positive and transformative experience for the frail and socially awkward adolescent. While horseback riding in the New Mexico wilderness, Oppenheimer and his companions would gaze upon the Los Alamos (Spanish for "The Poplars or Cottonwoods") mesa where twenty years later he would direct the atomic bomb project.

Oppenheimer entered Harvard in the fall of 1922 and graduated *summa cum laude* three years later in 1925 with a degree in chemistry. He took a wide variety of courses from philosophy and French literature to graduate courses in physics. He even took a course with eminent mathematician and philosopher Alfred North Whitehead, working through *Principia Mathematica* written by Whitehead and Bertrand Russell. Though his degree was in chemistry, it was physics where he found his home. In fact, Percy Bridgman, who would win the 1946 Noble Prize for Physics, was a primary influence on Oppenheimer. Having taken courses from Bridgman as well as

working in his laboratory, Oppenheimer had decided to pursue a doctorate in experimental physics.

In September 1925, Oppenheimer set sail for England where he had been accepted at the Cavendish Laboratory at the University of Cambridge. This would be a disappointing and dark time for Oppenheimer, still in many ways an adolescent. He discovered that he did not have the interest or competence to become an experimentalist. But by early 1926, things were looking up because Oppenheimer had found that his interests and abilities lay in theoretical physics. He "became friends with the influential Cambridge physicists Paul A. M. Dirac and Ralph H. Fowler. … [who] were the theoreticians and helped to broaden Oppenheimer's view of the field."[6] He was reading Werner Heisenberg and learning the new developments in quantum mechanics, and would meet the great Danish physicist Niels Bohr, who visited Cambridge later that spring. Bohr surely impressed the young Oppenheimer, and would come to have a profound influence on both Oppenheimer and his thought. In May 1926, Oppenheimer submitted his first paper entitled "On the Quantum Theory of Vibration-Rotation Bands" for publication.

That summer while visiting Cambridge, Max Born, who would win the Nobel Prize for Physics in 1954, invited Oppenheimer to pursue his doctorate at the University of Göttingen in Germany, a major center for theoretical physics and quantum mechanics. Less than a year later in March 1927, and less than five years after he had first entered Harvard as an undergraduate, Oppenheimer received his doctorate from Göttingen. By the summer of 1927, Oppenheimer published or completed the work for at least seven additional publications including work on the quantum theory of continuous spectra and the quantum theory of molecules using what is now called Born–Oppenheimer approximation, which mathematically separates nuclear and electronic motions.

He "spent the next two years, one in the U.S. and one in Europe, as a National Research Council (NRC) Fellow."[7] He interacted with the great physicists Paul Ehrenfest in Leiden and Wolfgang Pauli in Zurich. Oppenheimer and Rabi, also an NRC fellow, first met in 1928 in Leipzig. While an NRC fellow, Oppenheimer completed an

additional seven papers. One, submitted in March 1928, predicted the phenomenon of quantum tunneling by showing "that a weak electric field could dislodge electrons [electron emission] from the surface of a metal."[8] Today, in the context of radioactive decay by alpha emission, the prediction of quantum tunneling is usually credited to George Gamow and, independently to Edward Condon and Ronald Numbers. But as pointed out by physicist and historian John Rigden, this is incorrect since Oppenheimer's paper predated their papers by several months.[9]

Oppenheimer returned to the United States in the summer of 1929, and would not return to Europe for nearly two decades.[10] Oppenheimer, only 25 years old, was in great demand especially in America — with a German doctorate, an international reputation, and at the forefront of the quantum revolution. With perhaps ten offers from American universities, he accepted a joint appointment at the University of California at Berkeley and the California Institute of Technology at Pasadena, typically spending the fall and winter at Berkeley and the spring at Caltech.

In less than a decade, he would make Berkeley the major center for theoretical physics in the United States, and in the words of Hans Bethe who won the Nobel Prize for Physics in 1967, "J. Robert Oppenheimer did more than any other man to make American theoretical physics great."[11] During his California years, Oppenheimer did fundamental research in theoretical physics and worked in close collaboration with experimental physicists, for example, Ernest Lawrence and his Radiation Laboratory. Of particular note is a 1930 paper by Oppenheimer that "practically predicted the positron [the antiparticle of the electron] three years before its discovery by Carl Anderson."[12] In addition, Oppenheimer made significant contributions to the understanding of cosmic ray showers, meson theory, and nuclear reactions (e.g., Oppenheimer–Phillips process).

Most fascinating, as discussed in detail by Ray Monk, Oppenheimer in the late 1930s published three papers on astrophysics, each with a different co-author (i.e., two of his students along with his younger colleague Robert Serber).[13] These papers investigated neutron stars and gravitational collapse — what later became known as black holes.

This series of papers was groundbreaking, but largely neglected for nearly thirty years. Physicist and biographer Jeremy Bernstein has called the third paper in this series "one of the great papers in twentieth-century physics."[14] According to Monk, "Many people think that, if he had lived a little longer, Oppenheimer would have received the Nobel Prize for these papers."[15] The Nobel Prize, of course, can only be given to a living person, and Oppenheimer died in 1967 at age 62.

Beginning in 1936, Oppenheimer's interests took on a new dimension. Before this, he had little interest in social issues and politics. He did not read a newspaper, did not have a radio, and voted for first time in the 1936 presidential election. In large part because of his romance with Jean Tatlock as well as the world depression and the rise of Fascism in Europe, Oppenheimer became involved in left-wing social and political issues. For example, he donated funds to the Loyalist cause in the Spanish Civil War and was active in the East Bay Teacher's Union.

A daughter of a Berkeley English professor, a graduate of Vassar, and training to be psychiatrist, Tatlock was an "on again, off again" member of the communist party.[b] Oppenheimer's brother Frank and his wife had also joined the communist party. In 1939, Tatlock and Oppenheimer finally broke up. In the summer of 1939 in Pasadena, Oppenheimer met Katherine "Kitty" Puening and they were married in November 1940. They would have two children — a son Peter and a daughter Katherine "Toni." One of Kitty's former husbands, Joe Dallet, had been a member of the communist party and had died fighting in Spain, and she had been a party member for about two years (1934–1936) during the first part of their marriage.[16]

Robert Oppenheimer was certainly a fellow-traveler during the 1930s, but he steadfastly denied that he was ever a member of the communist party. In fact, in his March 1954 letter (which was read

[b]For a wonderful and well-researched book on the three women whom Oppenheimer loved and who "gave shape to his life," see Shirley Streshinsky and Patricia Klaus, *An Atomic Love Story: The Extraordinary Women in Robert Oppenheimer's Life* (Nashville, TN: Turner Publishing, 2013). The three women are Jean Tatlock, Kitty Oppenheimer, and Ruth Tolman.

into the record of his 1954 security hearing) replying to the official letter which informed him of the suspension of his security clearance, Oppenheimer stated and in effect testified that he "was never a member of the [communist] party, concealed or open."[17] Oppenheimer scholars Kai Bird and Martin Sherwin agree with Oppenheimer while Gregg Herken holds that he was a secret member during the 1930s. In any case, all agree that Oppenheimer was not a spy and was loyal to the United States.[c]

With the discovery of nuclear fission in December 1938 in Germany and the outbreak of World War II in September 1939 when Germany invaded Poland, the possibility of atomic weapons began to take center stage. With the shock of the Japanese attack on Pearl Harbor in December 1941 and the entry of the United States into the war, the race to build the atomic bomb was on. Oppenheimer had already been involved in research into nuclear fission by early 1941, and was officially appointed director of fast-neutron research as related to the atomic bomb in May 1942. Five months later in October, General Leslie Groves, who was in charge of the Manhattan (Atomic Bomb) Project, selected Oppenheimer to be the scientific director of the central laboratory dedicated to the development of an atomic bomb. In November while on an official trip, Oppenheimer showed Groves Los Alamos, and the general quickly decided that this would be the site for the secret laboratory to build the bomb.

Appointing Oppenheimer as scientific director of Los Alamos was a bold and controversial move on Groves' part. Oppenheimer was a theoretician with no administrative experience organizing

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[c]For a discussion of Soviet spying and Oppenheimer, see Gregg Herken, "Target *Enormoz*: Soviet Nuclear Espionage on the West Coast of the United States, 1942–1950," *Journal of Cold War Studies* **11** (Summer 2009). In his article using evidence from the "Soviet State Security Committee (KGB) documents transcribed in Alexander Vassiliev's notebooks," Herken makes a convincing case that "Oppenheimer was never a spy" (p. 84) even though "the KGB had a growing interest — and, ultimately, a near obsession — with recruiting Oppenheimer." (p. 78) Herken's conclusion is reconfirmed in John Earl Haynes, Harvey Klehr, and Alexander Vassiliev, *Spies: The Rise and Fall of the KGB in America* (New Haven & London: Yale University Press, 2009), p. 58.

experimental, let alone engineering, work. In addition, Oppenheimer lacked a Nobel Prize and had a questionable background from the perspective of military intelligence. However, Groves insisted on the appointment and, in the end, was proved right. In July 1945, the first atomic explosion was conducted in the deserts of New Mexico. Less than a month later, on August 6, an atomic bomb destroyed Hiroshima and three days later another leveled Nagasaki. The next day the Japanese offered to surrender and a few days later the war was over. In the view of historians as well as his wartime colleagues, Los Alamos owed much of its success to Oppenheimer's inspiration and leadership as well as his scientific brilliance and understanding.[18]

With the end of war, Oppenheimer was heralded as "Father of the Atomic Bomb" and became an international as well as national figure, and was awarded the Medal of Merit by President Truman for his work at Los Alamos. In October 1945, he officially resigned as the director of Los Alamos, and returned to California in November to resume teaching. Though his personal research in physics effectively ended in 1942 with his work on the atomic bomb, Oppenheimer would continue to stay up with physics and would influence its development. In 1947, he became director of the Institute for Advanced Study in Princeton, and continued in this position until June 1966.[19] Oppenheimer died of throat cancer eight months later on February 18, 1967.

Immediately after the war, Oppenheimer became an influential voice in Washington and played a leading role in shaping atomic policy. In particular, he had a central role in formulating the Acheson–Lilienthal Report, which will take on a significant and illuminating role in our later exploration of Oppenheimer's thought. This report provided the framework for the proposal by the United States presented to the United Nations for the international control of atomic energy. In particular, it would abolish atomic weapons from national arsenals, and hence lead to nuclear disarmament and "a world free of nuclear weapons." From 1947 to 1952, Oppenheimer also served as chairman of the powerful General Advisory Committee (GAC) to the Atomic Energy Commission (AEC). The GAC is noted for its opposition to a crash program to develop the hydrogen (thermonuclear)

bomb as an answer to the successful atomic test by the Soviet Union in August 1949, which broke the American atomic monopoly. Instinctively and somewhat precipitously, President Truman rejected the recommendation of the GAC, and the United States proceeded with its crash program and exploded its first thermonuclear device in 1952. In addition, Oppenheimer served as a consultant on continental defense, civil defense, and the use of tactical nuclear weapons.[20]

By 1952, Oppenheimer's influence was waning. He resigned from the GAC in August 1952 and Rabi became its new chairman.[21] In November, the Republicans won both the presidency and took control of the Senate and House. In the fall of 1953, Oppenheimer gave the BBC Reith Lectures in England. Shortly after his return from Europe, Oppenheimer was informed on December 21 by AEC chairman Louis Strauss, one of his archenemies, that his security clearance had been suspended. Oppenheimer requested a hearing before a personnel security board. The ruling of this confidential hearing (though much of the transcript was publicly released shortly thereafter), which lasted more than three weeks during April and May of 1954, was a 2 to 1 decision to uphold Oppenheimer's suspension. The AEC commissioners agreed with the board's upholding of the suspension by a vote of 4 to 1. The loss of his security clearance in conjunction with the humiliation of the hearing was a jarring blow for Oppenheimer.

Due to his powerful influence on policy decisions, and in part his own personality, Oppenheimer was a polarizing figure and had made powerful enemies in the government (e.g., Louis Strauss), the military (e.g., the Air Force), the scientific community (e.g., Edward Teller), and the press (e.g., the Luce publishing empire). For his enemies, Oppenheimer's behavior was bewildering even suspicious, especially his opposition to the H-bomb. Given his left-wing past and unwise actions on his part (e.g., the "Chevalier incident"),[d] he thus

[d]Haakon Chevalier, a member of the American Communist Party, was a French professor at Berkeley and a close friend of Oppenheimer. In the winter of 1942–43 at Oppenheimer's home in Berkeley, Chevalier "passed on a feeler as to whether Oppenheimer would provide information [about the atomic bomb project] to the Russians through a Soviet consular official in San Francisco. Oppenheimer immediately refused, but he delayed several months before reporting the feeler to Army

proved an inviting target for those who saw him as a danger to national security. For others, Oppenheimer became the most prominent victim of McCarthyism.

In 1963, President Lyndon Johnson presented Oppenheimer the prestigious Enrico Fermi Award of the Atomic Energy Commission. Though perceived as making amends, this gesture was seen in large part as an attempt at rehabilitating Oppenheimer's public reputation. There is a touch of irony here since Teller, one of Oppenheimer's archenemies, received the Fermi Award the year before. Over his career both in and out of science, Oppenheimer received numerous awards and honors — including being elected a member of the National Academy of Sciences and Royal Danish Academy of Sciences, and a fellow of the American Academy of Arts and Sciences and the American Physical Society.

Oppenheimer's loss of his security clearance marked the end of his work as a government adviser. Of course, Oppenheimer continued his work as director of the Institute for Advanced Study. Just as important, he persisted in being a spokesperson for science and more generally a public intellectual — speaking at innumerable events, celebrations, and conferences together with publishing articles and lectures. His opinions and views were widely covered in the public media. Combining eloquence with a lasting authority based on his leadership of the Manhattan Project, Oppenheimer endured as an interpreter of science and its new relationships to society. Most important, he still spoke as an interpreter of the atomic revolution and offered hope for transcending the atomic crisis.

Biographers and commentators have highlighted and explored several biographical themes and interpretations for understanding Oppenheimer and his historical significance. One is certainly Oppenheimer's dedication to and love of science, especially physics. His active involvement and contributions to physics during its revolutionary

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intelligence and then lied about the circumstances in the hope of protecting Chevalier [and possibly others, as well as alerting Army intelligence]." (McMillan, *Ruin of J. Robert Oppenheimer* (ref. 234), p. 192). The "Chevalier incident," along with lying about it, played a crucial role in the AEC Board justifying its decision not to reinstate Oppenheimer's security clearance and hence causing his political downfall.

period in the first half of the 20th Century was instrumental in forming his personality, reputation, and philosophical thought about science. Biographer Ray Monk dedicates a significant part of his book to Oppenheimer's scientific endeavors, and explores how Oppenheimer's life "was shaped and driven by his desire to understand physics."[22] As noted by many, Oppenheimer's dedication to and success in bringing modern theoretical physics to America in the 1930s — making American physics a rival to European physics that would surpass it in the 1940s — is historically important. For physicist and biographer Abraham Pais, this was "the most important contribution of his life."[23]

Another theme for understanding Oppenheimer is his love for America and lifelong patriotism. George Kennan, diplomat and close friend of Oppenheimer — and defender of Oppenheimer at his security hearing — was the concluding speaker at the Oppenheimer memorial service in 1967. Kennan insisted the "truth is that the US Government never had a servant more devoted at heart than this one, in the sense of wishing to make a constructive contribution." Furthermore, Kennan recalled that shortly after the 1954 security hearing, he "had asked Oppenheimer why he hadn't left the country, noting that he would be welcomed in 'a hundred academic centers' around the globe." Oppenheimer replied with tears in his eyes, "Damn it, I happen to love this country."[24] Kennan's affirmation stands in stark contrast to Oppenheimer's political enemies who accused him of being a closet communist attempting to undermine the national security of the United States. Like other biographers, Monk stresses "the importance of Oppenheimer's deeply felt and lifelong patriotism." For instance,

> In the 1930s he had set out to build an *American* school of theoretical physics that would enable the USA to replace Germany as the leading centre for research in that area; now [in 1942] he had a chance to lead a project that would not only demonstrate the superiority of American physics, but would also, in so doing, equip the US with a weapon that would enable it to win the war against Germany.[25]

Other features were Oppenheimer's brilliance and quickness of mind combined with his multifaceted, polymath personality.

The result was an eloquent, charismatic teacher and leader remarkable as a synthesizer and summarizer. According to physicist Robert Serber, who was a younger colleague of Oppenheimer's,

> Many facets of Oppenheimer's character contributed to his greatness as a teacher: his great capacity as a physicist, his wide intellectual interests, his astonishing quickness of mind, his great gift of expression, his sensitive perception, his social presence, which made him the center of every gathering. His students emulated him as best they could. They copied his gestures, his mannerisms, his intonations. He truly influenced their lives.[26]

Biographer and sociologist Charles Thorpe analyses Oppenheimer as the charismatic leader at Los Alamos. Though his leadership was "a collective task and a collective accomplishment,"[27] Thorpe contends that

> Oppenheimer was celebrated at Los Alamos for his ability to see the big picture: to synthesize the entire body of science involved in the project and, from this overall perspective, to bring order and cohesion to decision making and discourse. Famously, he could sum up opposing views in such a way that the argument would appear resolved — his "magical trick that brought respect" even from those who were "his superiors in terms of their scientific record." Although not set apart by a Nobel Prize, he was seen to be able to "rise above" the scientific flock, due to this combination of moral and intellectual qualities. His authority derived from an ability to speak for and bring to bear a consensus that was seen to already exist in potential. His synthetic knowledge, together with his perceived moral qualities, allowed him to reconcile conflicting parties and made him the "natural" spokesman for an underlying, though not yet realized, consensus. It was this underlying collegial consensus, for which he was believed to speak, that was the root and source of his authority; hence the close association between Oppenheimer's leadership and organizational forms … that expressed that collegial order.[28]

Oppenheimer as a flawed individual is another prominent biographical theme. He was arrogant and sharp-tongued, and has been

taken as insecure and fragmented. In the words of physicist and biographer John Rigden, Oppenheimer lacked a "sense of self." Moreover, as highlighted by others, Monk maintains that

> Oppenheimer cannot be understood without taking into account the importance of his deeply felt desire to overcome the sense of being an outsider that he inherited from his German Jewish background and his desire to get inside the centre of American political and social life.[29]

Given these faults along with a titanic ambition and a certain level of naïveté, Oppenheimer was susceptible to being manipulated especially given certain vulnerabilities (e.g., the "Chevelier incident" and his communist affiliations). Certainly, Captain de Silva, who was in charge of security at Los Alamos, believed this. In a 1943 memo to his superior concerning Oppenheimer and possible involvement in Soviet espionage, de Silva concluded (as set forth by Monk) that

> "Oppenheimer is deeply concerned with gaining a worldwide reputation as a scientist, and a place in history" through his leadership of the Los Alamos laboratory. The army [de Silva] maintained, "is in the position of being able to allow him to do so or to destroy his name, reputation, and career, if it should choose to do so." [De Silva] ended up suggesting that, if "strongly presented to him", the fact that the army could destroy his reputation, "would possibly give him a different view of his position with respect to the Army, which has been, heretofore, one in which he has been dominant because of his supposed essentiality."[30]

Concerning Oppenheimer's scientific character, and as emphasized by the physicist Freeman Dyson in his review of Monk's biography, Oppenheimer has been viewed as lacking what Germans call *Sitzfleisch* (sitting flesh as on a chair) or perseverance in English.[31] Dyson knew Oppenheimer as a friend and colleague at the Institute for Advanced Study. Murray Gell-Mann, who won the Nobel Prize for Physics in 1969 and was at the Institute for Advanced Study in 1951, agrees with Dyson saying,

> As far as I know, he [Oppenheimer] never wrote a long paper or did a long calculation, anything of that kind. He didn't have patience for that; his own work consisted of little *apercus*, but quite brilliant ones. But he inspired other people to do things, and his influence was fantastic.[32]

To a degree, this explains why Oppenheimer, even given his brilliance, was never awarded the Nobel Prize, and what philosopher and historian Robert Crease has called "Oppenheimer's ambiguous scientific legacy."[33]

Another biographical theme for understanding Oppenheimer is his commitment to internationalism and in particular scientific internationalism. Central to this theme are his efforts for the international control of atomic energy together with the influence of Niels Bohr and the idea of an Open World. This theme plays a prominent role in the following chapters.

Furthermore, the controversies and political battles that Oppenheimer engaged in have been the subject of historical interpretation as well as biographical analysis. Of particular note are the hydrogen bomb controversy and the resulting decision for a crash program to develop the H-bomb or Super, a bomb 1000 times more powerful than the atomic bomb dropped on Hiroshima. The GAC, under Oppenheimer's chairmanship, opposed the crash program on moral as well as technical grounds saying in the majority annex to its report that the Super "might become a weapon of genocide." In the minority annex, Rabi and fellow physicist Enrico Fermi even referred to the Super as "necessarily an evil thing considered in any light."[c] Though their recommendation was

[c]This use of such strong moral condemnation to characterize the Super is found in the GAC Report concerning a crash program to develop the hydrogen bomb. In October 1949 the General Advisory Committee (GAC) of the Atomic Energy Commission, chaired by Oppenheimer, announced (not to the public since this report was top secret) its opposition to a crash program to develop the super bomb. For the GAC such a program could not be technically justified at that time, and morally such "a super bomb might become a weapon of genocide" and "is necessarily an evil thing considered in any light." Others saw the crash program as a necessary response to the Soviet atomic bomb test in August 1949 that ended the US atomic monopoly. In January 1950 Truman announced his decision to develop the

rejected, the GAC (with veterans of the Manhattan Project like Oppenheimer, Fermi, and Conant who had supported the military use of the atomic bomb during the war) "made it clear that nuclear weapons policies must no longer be decided in a moral vacuum."[34] According to biographers Kai Bird and Martin Sherwin,

> In retrospect — and even at the time — it was clear that the H-bomb decision was a turning point in the Cold War's spiraling arms race. Like Oppenheimer, Kennan was thoroughly "disgusted." I. I. Rabi was outraged. "I never forgave Truman," he said.[35]

However, no member of the GAC resigned in protest.

For any interpretative understanding of Oppenheimer, the 1954 security hearing looms large. For science historian and biographer David Cassidy, Oppenheimer could have

> successfully stood up to the bullies. He still possessed the national and international stature to brush off these trumped-up charges and to refuse to accept the terms of such a proceeding. … Public resignation in outrage at his treatment would have done more to defend science and his own reputation than his sinking to the level of his accusers in an inevitably degrading attempt to defend his personal views and private behavior.[36]

But Cassidy reminds his reader that this was "out of character" for Oppenheimer and "would have required him suddenly to assume a wholly different role as a moral protest leader." Moreover, he would voluntarily be

> giving up the power and prestige and participation in high councils that he had worked so hard to attain as the nation's ultimate insider

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hydrogen bomb. In direct opposition to the GAC, the "Second Atomic Revolution" had begun with the development of the Super — a bomb that would be 1000 times more powerful than the atomic bomb that had destroyed Hiroshima. Note the strong moral condemnation by the GAC is with respect to the super bomb not the atomic bomb. The GAC took the super bomb (based on nuclear fusion) to be in a totally different destructive category than the atomic bomb (based on nuclear fission). For excerpts and discussion of the GAC report, see McMillan, *Ruin of J. Robert Oppenheimer* (ref. 234), pp. 36–40.

> scientist, the valued and esteemed leader of the nation's established scientific elite. Even more than that, he had worked for years toward shaping the nation's science-policy system along rational, even moral lines, into a managerial system directed toward achieving a moderate policy encompassing arms control and restraints on the ever expanding application of science to military weaponry.[37]

In his letter of response to his accusers concerning the "alternative suggested [quiet resignation]," Oppenheimer wrote

> Under the circumstances this course of action would mean that I accept and concur in the view that I am not fit to serve this Government, that I have now served for some 12 years. This I cannot do. If I were thus unworthy I could hardly have served our country as I have tried … or have spoken, as on more than one occasion I have found myself speaking, in the name of our science and our country.[38]

Oppenheimer's choosing not to resign and to fight here points to many things from personal ambition to defending American science conjoined with an open and moderate policy with respect to nuclear weaponry.

Like Thorpe and others, Bird and Sherwin construe Oppenheimer's defeat as having historic connotations.

> For a few years after World War II, scientists had been regarded as a new class of intellectuals, members of a public-policy priesthood who might legitimately offer expertise not only as scientists but as public philosophers. With Oppenheimer's defrocking, scientists knew that in the future they could serve the state only as experts on narrow scientific issues. As the sociologist Daniel Bell later observed, Oppenheimer's ordeal signified that the postwar "messianic role of the scientists" was now at an end. Scientists working within the system could not dissent from government policy, as Oppenheimer had done by writing his 1953 *Foreign Affairs* essay [strongly recommending government "candor" with regard to nuclear weapons], and still expect to serve on government advisory boards. The trial thus represented a watershed in the relations of the scientist to the government. The narrowest vision of how American scientists should serve their country had triumphed.[39]

Moreover, they interpret that

> Oppenheimer's defeat was also a defeat for American liberalism. Liberals were not on trial during the Rosenberg atom spy case. … But like many Roosevelt New Dealers, Oppenheimer had once been a man of the broad Left, active in Popular Front causes, close to many communists and to the Party itself. Having evolved into a liberal disillusioned with the Soviet Union, he had used his iconic status to join the ranks of the liberal foreign policy establishment, counting as personal friends men like Gen. George C. Marshall, Dean Acheson and McGeorge Bundy. Liberals had then embraced Oppenheimer as one of their own. His humiliation thus implicated liberalism, and liberal politicians understood that the rules of the game had changed. Now, even if the issue was not espionage, even if one's loyalty was unquestioned, challenging the wisdom of America's reliance on a nuclear arsenal was dangerous. The Oppenheimer hearing thus represented a significant step in the narrowing of the public forum during the early Cold War.[40]

Ironically, as pointed out by Bird and Sherwin, the "publicity surrounding the trial and its verdict enhanced Oppenheimer's fame both in America and abroad." Not only was Oppenheimer the Father of the Atomic Bomb, but now he was also "a scientist martyred, like Galileo."[41]

In concluding this biographical sketch, Oppenheimer's association with the Congress for Cultural Freedom (CCF) is worth highlighting. In November 1954, six months after his security hearing and political exile, it was officially announced that Oppenheimer was elected to the American Committee for Cultural Freedom which was affiliated with the CCF. Oppenheimer would become a significant figure in the CCF, and participate in a number of its events. Founded in 1950, the CCF was an international organization of artists, writers, and intellectuals that actively opposed "Communism and all other forms of totalitarianism" in the so-called war of ideas. With affiliates in Europe, North America, South America, and Asia, the CFF sponsored journals, newsletters, conferences, and seminars.

Today, many historians give prominence to the view that the Cold War was an "Ideological Project" (a war of ideas). Remarkably, the CFF is symbolic of this interpretation. Amid disclosures of its CIA funding, the CCF was dissolved in 1967.[42] Among its hundreds of members, there were numerous Americans — George Kennan (diplomat), Reinhold Niebuhr (public theologian), John Steinbeck (novelist), Sidney Hook (philosopher), Arthur Schlesinger Jr. (historian), Diana and Lionel Trilling (literary critics), Irving Kristol (journalist and future founder of neoconservatism), Norman Cousins (journalist and world peace advocate), and, of course, J. Robert Oppenheimer.

Recent Scholarship and the "Oppenheimer Challenge"

The centennial of Oppenheimer's birth was in 2004 and was reflected in the publication of at least eight biographical books on Oppenheimer during the years 2004 to 2008. Of particular note is *American Prometheus: The Triumph and Tragedy of J. Robert Oppenheimer* by Kai Bird and Martin Sherwin, which won the 2006 Pulitzer Prize in biography. In addition, a collection of essays based on presentations at the 2004 Oppenheimer Centennial held at the University of California–Berkeley was published as well as some scholarly articles on Oppenheimer and substantial reviews of the above books.[43] In 2012, the interest in Oppenheimer reached new heights with the publication of an eight-hundred-page biography entitled *Inside the Centre: The Life of J. Robert Oppenheimer* by Ray Monk.

However, Oppenheimer as a subject presents us with major challenges. As illustrated in the biographical sketch, he was many things — scientist, weaponeer, government adviser, public intellectual, and icon for his age. Moreover, Oppenheimer was strategically placed and became the focus of historic forces and controversies that shaped the Twentieth Century. Consequently, as noted by historian Barton Bernstein, "Oppenheimer is not the kind of subject … for whom there will ever be a 'definitive' biography — too much of his life will remain subject to interpretive dispute."[44]

To illustrate differences in interpretation by Oppenheimer biographers, Charles Thorpe in his book, *Oppenheimer: The Tragic Intellect*

(2006), which he characterizes as a "sociological biography," contrasts his position with that of Bird and Sherwin and of Priscilla McMillan in her *The Ruin of J. Robert Oppenheimer* (2005). According to Thorpe, Bird and Sherwin take Oppenheimer as "an authentic voice of American scientific, intellectual, and political liberalism" and McMillan takes him as "a defeated moderating voice in American foreign policy." In contrast, Thorpe takes Oppenheimer as having failed "to develop a critical political perspective as his liberalism was shaped by the culture of the Cold War" and "in significant ways accommodated himself to and internalized the culture and mentality of the national-security state."[45]

Moreover, interpretations of Oppenheimer's philosophical outlook differ. Silvan Schweber, in his book *Einstein and Oppenheimer: The Meaning of Genius* (2008), emphasizes the influence of the Ethical Culture movement on Oppenheimer during his early years and places Oppenheimer, in part on the basis of his 1957 William James Lectures at Harvard and interactions with such philosophers as Morton White, in the tradition of American pragmatism. In contrast, using themes from the sociologist Max Weber (1864–1920), Thorpe emphasizes the role of such things as vocational ethics in Oppenheimer's thought.

On a more personal level, Oppenheimer presents a challenge. As Oppenheimer's close friend Rabi once remarked "God knows I'm not the simplest person, but compared to Oppenheimer, I'm very, very simple."[46] Oppenheimer has been taken as "elusive," "enigmatic," and "fragmented." For some, Oppenheimer was "a person who, throughout his entire life, tried on different masks … without ever establishing a coherent identity or gaining a sense of who he was."[47] Oppenheimer could also promote "a love-hate relation." Abraham Pais, a close colleague of Oppenheimer's at the Institute for Advanced Study, knew "of largely just love or hate responses among many who knew" Oppenheimer, analogous to "the ways people react to New York City."[48]

Finally, Oppenheimer's thought and philosophical outlook present another challenge. For one, Oppenheimer like many other intellectuals never wrote a book that is a systematic exposition of his views. For example, his book *Science and the Common Understanding* is his

BBC Reith Lectures given in 1953, and his book *The Open Mind* is a collection of eight lectures delivered between 1946 and 1954. Additionally, the majority of sources for Oppenheimer's thought consists of lectures and talks, both published and unpublished. Since they were tailored for different live audiences, these works are repetitive, make little or no reference to previous works, and in many cases lack detail and depth. Such an approach for presenting one's views was by no means unique to Oppenheimer and is found among other scientists and intellectuals; for example, Bohr and Rabi took this approach.[49]

Oppenheimer's lecturing style also presents challenges. He typically lectured using abbreviated notes; and his poetic, oracular style could leave audiences more mesmerized than informed. Interestingly, Thorpe notes that Oppenheimer attempted to tutor David Lilienthal, a friend and government official, in the art of such lecturing by praising one of Lilienthal's speeches as "very sound and deep and with just the right lightness of touch in pointing to the great human and ethical substrata that determine our way of life without handling them in such an explicit way that the touch destroys."[50]

In spite of this, the corpus of Oppenheimer's works is extensive and provides for a discussion and criticism of his views as well as considerations of influence and development over time. Furthermore, it not only contains individual lectures and talks, but also contains several lecture series which assist in adding detail and depth to his views. Three lecture series have been published, and at least four others have been transcribed.[51] Also, Oppenheimer did revise and edit to varying degrees the lectures and talks that he published as well as wrote articles directly for publication. In addition, Oppenheimer's interactions with other intellectuals — scholars, scientists, and artists — can be documented and assist in exploring and elaborating Oppenheimer's thought and philosophical outlook.[52] In particular, Oppenheimer's interactions with the Pulitzer Prize-winning poet Archibald MacLeish as well as his close friend and Nobel Prizing-winning physicist I. I. Rabi will be the subjects for Chapters 3 and 4, respectively.

To conclude this chapter, let us return to biographical themes that assist in interpreting and understanding Oppenheimer. As explored and highlighted earlier, there are Oppenheimer's dedication and

commitment to science, especially physics; his love of and loyalty to America; and his commitment to internationalism. There is also the theme of his brilliance and polymath characteristics in conjunction with a fragmented personality and significant human failings.

There are other biographical themes as well, and certainly one of them is centered on responsibility. In his 1954 security hearing, Oppenheimer was questioned why he felt it was his "function as a scientist to express views on military strategy and tactics." Oppenheimer replied "I felt, perhaps quite strongly, that having played an active part in promoting a revolution in warfare, I needed to be as responsible as I could with regard to what came of this revolution."[53] Even though responsibility for the atomic revolution is in large measure a collective responsibility, Oppenheimer's taking responsibility at the individual level is fitting given the significant role he played in this revolution. Indeed, in some ways, it was necessitated. In addition to the part he played, Oppenheimer had knowledge and abilities along with political and symbolic capital to step forward and take responsibility and help shape "what came of this revolution." This responsibility clearly exhibited at least two dimensions. The principal dimension was to help shape government policy, both domestic and foreign, with regard to nuclear weapons and energy. This is illustrated by his leading role in the 1946 Acheson–Lilienthal proposal for the international control of atomic energy, his chairmanship of the General Advisory Committee to the AEC and its 1949 opposition to the H-bomb, his recommendations for flexible response and civil defense in nuclear strategy, and his refusal to resign and hence confront oppositional forces in his 1954 security hearing.

Another dimension of his individual responsibility was to assist and facilitate the general public as well as elites in confronting and understanding the atomic revolution. This dimension is certainly illustrated by his public presentations — in number, subject matter, and audience. In addition, given the urgency and public nature of this responsibility, it is understandable, in part, why he might not attempt a scholarly, systematic exposition of his views and even recommend the need for a certain "lightness of touch."

In December 1966, less than two months before Oppenheimer died, Thomas Morgan of *Look Magazine* published a conversational piece entitled "With Oppenheimer." In this conversation, surely sensing his own mortality and legacy, Oppenheimer remarked

> The use of the word "responsibility" … is almost a secular device for using a religious notion without attaching it to a transcendent being. … Now, I don't know how to describe my life without using some word like "responsibility" to characterize it, a word that has to do with choice and action and the tension in which choices can be resolved.[54]

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Chapter 2

Oppenheimer's Hope and Vision 1957–1959

Background

In April and May of 1957, Robert Oppenheimer delivered the William James Lectures at his *alma mater*, Harvard University, where he graduated in 1925. Oppenheimer had been invited by both the philosophy and psychology departments, and joined a prestigious rank of previous lecturers. The great American philosopher John Dewey (1859–1952) had delivered the first James Lectures in 1931 and was followed by such luminaries as Bertrand Russell (1872–1970) and B. F. Skinner (1904–1990).

Later that spring, Oppenheimer participated in a five-day Fulbright conference on higher education which was sponsored by Columbia University and hosted at Sarah Lawrence College. The conference organizers planned for "over 70 participants including 45 visiting scholars and 25 American scholars" and arranged an afternoon visit to the United Nations.[55] Touching on many of the ideas presented in his James Lectures, Oppenheimer delivered an evening address that was later published in 1959 as "Science and the Human Community."

Oppenheimer concluded this address with an idea, really a hope and vision, not found in his James Lectures.[f] He spoke of "the

[f]A word of caution is needed here. The theme of the James Lectures, which consisted of eight lectures, was "The Hope of Order." The fifth lecture, "An Unfamiliar Order," was not recorded and hence there is no transcript/manuscript for this

sovereign, unlimited, all-powerful nation-state" as "a pretty deadly and impossible form for the organization of mankind." With a reference to "a rather muted shout" by Niels Bohr and an indirect reference to the Acheson–Lilienthal proposal of 1946 for the international control of atomic energy, in which Oppenheimer played such an important part, he said "The creation of vital, strong, international communities [i.e., an international communitarian pluralism] must precede the creation of international organs of comparable strength and vitality. And this, in turn, is probably what must precede the formal regulation of the sovereign national will."[56]

In June, Oppenheimer delivered another address, "Nuclear Power and International Relations," at the Princeton University Conference on NATO; and in October, another talk, "The Environs of Atomic Power," at the Twelfth American Assembly conference associated with Columbia University. The Princeton NATO conference with over 60 participants from Europe and North America included ambassadors and members of parliament from such countries as Canada, France, England, Greece, and Italy and three members of the United States Congress as well as retired military personnel, journalists, academics, and some labor and business leaders.[57] The American Assembly conference, also with over 60 participants, included scientists, business and labor leaders, newspaper editors, and academics.[58]

As in his address at the Fulbright conference, Oppenheimer concluded these two presentations with the same hope and vision based on an international, communitarian pluralism. Months later, in April of 1958, Oppenheimer "spoke to a group of editors and journalists from all over the world who had gathered in Washington for a meeting of the International Press Institute." Again, this address, "The Tree of Knowledge," concluded with the same expressed hope and vision and was placed before the public by being published in the October issue of *Harper's Magazine*.[59]

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lecture. So it is possible that this hope and vision (i.e., specialized communities needed to bring about the regulation of the sovereign national will) occurred in the fifth lecture.

In these presentations and publications, Oppenheimer posited that the nature of defense problems, economic development, and communications with its technology would pull us together and help tame "a fierce nationalism." But to break the "grip" of nationalism and survive these unprecedented times, Oppenheimer pointed to the need for "the creation of vital, strong, international communities." These would be "fraternal communities … embarked on specialized work" and would include "communities of the mind." For him, "If the nations provide the warp of our life, these communities provide a kind of woof."[60]

A Vital Center for Oppenheimer's Thought

I contend that by exploring and elaborating on this hope and vision given at the end of these four presentations (three of which were published) provides an insightful way — really a "vital center" both temporally and conceptually — for stepping into Oppenheimer's life and thought.[g] Its roots lie in his earlier works and activities (e.g., the attempt at the international control of atomic energy which serves as the focus of Chapter 5), and it is supported and reflected in his later works as well as his interactions with other public intellectuals like Archibald MacLeish and I. I. Rabi (the subjects of Chapters 3 and 4, respectively).

Moreover, this hope and vision displays some of the constants and invariants that shaped Oppenheimer's life and thought (e.g., a communal view of science). Oppenheimer's references to Bohr are of particular note. As documented by several scholars, the influence of Bohr on Oppenheimer was significant; and to fully appreciate this, we will be led (in Chapter 6) to the role of Bohrian complementarity in Oppenheimer's thought. Most important, with this hope and vision in hand, we will then (in later chapters) consider Oppenheimer and his thought in a more philosophical light as well as from the perspective of contemporary international relations theory.

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[g]Many of the ideas in Oppenheimer's hope and vision are also repeated in a magazine article by Thomas B. Morgan, "A Visit with J. Robert Oppenheimer," *Look Magazine* (April 1, 1958).

These four works of 1957–59, where he sets forth this vision, interestingly break into two pairs. The two talks and resulting publications, "Science and the Human Community" and "The Tree of Knowledge," were addressed to educators and members of the press, respectively, and mainly deal with cognitive and cultural issues. The other two talks, "Nuclear Power and International Relations" and "The Environs of Atomic Power," were addressed more to government officials, former military personnel, and business leaders, and dealt mainly with nuclear power and defense issues related to nuclear weapons.

We begin with the two works that focus on the cognitive and cultural. These two addresses "talk about the nature and structure of our knowledge [science] today and how it has altered and complicated the problems of" education and the press.[61] The ideas and themes in these works essentially all occur in Oppenheimer's James Lectures as well as his earlier works. However, some important ideas are missing in these two addresses — for instance, Oppenheimer's distinction between thematic and propositional discourse, and complementarity in atomic physics and its extension to other areas of human experience.

In his James Lectures, Oppenheimer spoke of "our cognitive predicament" and the resulting cultural crisis, and this continues as the dominant theme in both "Science and the Human Community" and "The Tree of Knowledge." This cognitive predicament or crisis results from many factors — for example, knowledge doubling every ten years. The most significant factor, though, is that knowledge (science) in the modern world is necessarily based on specialization which results in fragmentation and difficulties of communication. Since science is the primary force shaping the modern world, such specialization threatens both public discourse and cultural coherence, and hence alters and complicates problems in such areas as education and journalism.

To see this more clearly, let us consider Oppenheimer's views on science and specialization. First, Oppenheimer takes a broad conception of science with it encompassing history as well as such fields as physics. In fact, science includes "anything that can be talked of in an objective way so that people … can understand it, know what the

scientist has done, reproduce it, and find out if it is true or not."[62] For Oppenheimer, objectivity is based on unambiguous communication, not ontology. Though science arises from and is continuous with common sense as well as cumulative in its development, Oppenheimer took a pluralistic, non-hierarchical view of science. There is no fundamental or foundational discipline or specialization in the sciences. Instead, the unity of the sciences is much more indeterminate and based on the absence of contradiction and the fructification of various specializations (e.g., from logical implication to suggestive analogy). Science is like a "network" with no simple unifying and reductive principles. In his 1953 BBC Reith Lectures, Oppenheimer developed the metaphor of the House of Science, which is open to all but so vast that no one can know more than one or perhaps a few of its rooms. New rooms are added and walls removed, but the House of Science has "no central chamber."[63]

Even though the structure of scientific knowledge and how it is produced (specialization) can threaten public discourse and cultural coherence, science significantly enriches society both materially and spiritually. Material fruits are technological and result from the knowledge and power generated by science. Except for atomic energy, Oppenheimer spends little time addressing the material fruits of science since the spiritual fruits are his major concern. To begin, science is a collective effort — a democratic meritocracy which serves as a model or prototype for social organization providing cultural and personal enrichment. The findings and spirit of science directly affect the philosophical forces and ideas that shape culture as well as promote optimism, rationality, and critical debate within a framework of empirical inquiry. Two of Oppenheimer's favorite examples of the influence of science on culture are Newtonian physics and the Enlightenment, and Darwinian evolution and the naturalization of man. Another key example is Bohrian complementarity in atomic physics and its relevance for modern society. This plays a major role in Oppenheimer's thought and will be discussed later in Chapter 6.

Science enriches its participants by developing such virtues as humility, cooperation, and self-reliance. It promotes a healthy skepticism; and since science is an open-ended and perhaps never capable

of completion, one comes "to have a great caution in all assertions of totality, of finality or absoluteness."[64] More important for us, Oppenheimer took science as "a way of life" — a form of craftsmanship — with the "true responsibility of a scientist [being] … to the integrity and vigor of his science."[65] For Oppenheimer, science is best construed as a mode of action or doing.

Though it enriches its participants, science is not merely an individualistic enterprise. Science is a "collective effort in which there is a clear and well-defined community whose canons of taste and order simplify the life of the practitioner." The community of science displays "a total lack of authoritarianism" because it has refined "techniques for the prompt discovery of error" that all members of the community acknowledge and respect. Further, science "is a field in which the technique of experiment has given an almost perfect harmony to the balance between thought and action."[66] This communal view of science as well as science as craft permeate Oppenheimer's work, and help mitigate what has been called "the antinomy between the individual and the community."

Since, to a large extent, knowledge in the modern world is based on specialization, the "traditions of science are specialized traditions," and this is what gives such "enormous thrust and power to the scientific experience."[67] Most important, as Oppenheimer said in his talk "Science and the Human Community" as well as his James Lectures, knowledge is not so much a property of individuals, but rather a property of specialized communities — "The receptacle of all the knowledge we have, the agencies to whom this knowledge is entrusted and who create it, are not individual men. They are communities of men. They are the specialized professions, often increasingly specialized" — and this results in a kind of "cognitive syndicalism."[68] Furthermore, "the cultural values of the life of science almost all lie in the intimate view [i.e., in specialization]: it is here that the hard lessons, the real choices, the great discoveries, the great disappointments, the new techniques are vivid and clear and detailed, and not in the general encyclopedia-like description of what the progress of science is all about." However, specialization is "one of the things which also makes the great problem of teaching and explaining the sciences."[69]

Therefore specialization, though necessary for epistemic honesty and meaning, threatens both public discourse and communal understanding. In many ways, this is not so much a problem of making information available; it is more a problem of the non-specialist's lack of semantic understanding or even imagination which is acquired through specialization and action.

So what did Oppenheimer recommend we do, given the inevitability that specialization will lead to cognitive and cultural fragmentation, and the resulting temptation to present oversimplified summaries of the specialist's knowledge and understanding? In the end, for the individual, his recommendation took the form of a "dual duty" of both specialization ("a duty of faithfulness and firmness" to one's specialty) and engagement with the broader community ("a duty of great openness to others").[70] In "The Tree of Knowledge," Oppenheimer wrote

> all of us in our years of learning, and many if not most of us throughout our lives, need some true apprenticeship, some hard and concentrated work, in the specialized traditions. This will make us better able to understand one another but, most important of all, it will clarify for us the extent to which we do not understand one another. It will not be easy. It means a major change in the way we look at the world and in our educational practices. It means that an understanding of the scope, depth, and nature of our ignorance should be among the primary purposes of education. But to me, it seems necessary for the coherence of our culture, and for the very future of any free civilization.[71]

Two points are important here. First, Oppenheimer did not restrict apprenticeships to the sciences since he took "specialized traditions" to include such fields as law and architecture. Second, and most important, this is a call for second-order knowledge or understanding — that is, knowledge or understanding about knowledge that is obtained through specialization. Such second-order knowledge is required not only for coherence within the scientific community, but also for cultural coherence due to the richness and pluralism of the cognitive world.

Engagement among persons from various specialized traditions requires openness and creates bonds between specialized communities. Such engagement can take diverse forms, but a favorite for Oppenheimer is the telling of "stories." A central part of Oppenheimer's 1953 BBC Reith Lectures was the origin of the quantum theory of atomic systems in the early part of the twentieth century, with an emphasis on Bohr's idea of complementarity. When he turned to his detailed discussion of atomic physics, Oppenheimer prepared his audience by saying,

> We must talk of our subject not as a community of specialized scientists but as men concerned with understanding, through analogy, description, and an act of confidence and trust, what other people have done and thought and found. So men listen to accounts of soldiers returning from a campaign of unparalleled hardship and heroism, or of explorers from the high Himalayas, or of tales of deep illness, or of a mystic's communion with his God. Such stories tell little of what the teller has to tell. They are the threads which bind us in community and make us more than separate men.[72]

In particular, genuine cognitive and cultural bonding by such engagement requires epistemic second-order understanding obtained through some hard and concentrated work in a specialized tradition — that is, a true apprenticeship. Oppenheimer appears to have held that this second-order knowledge or understanding cannot be directly communicated since it is a tacit understanding obtained through specialization, that is, action and experience within a community.

As suggested above, though our cognitive predicament is formidable, part of the solution lies in higher education. In his talk "Science and the Human Community" at the Fulbright conference on higher education, Oppenheimer recommended that undergraduates should "Try to learn something very well indeed. And do not just learn what it is in general terms. Learn it as a practitioner; learn how to do it." Further, he expressed his skepticism of "the general-education approach" and took survey courses as serving "a necessary purpose only because without them one cannot navigate" in the intellectual world.[73]

In earlier works, Oppenheimer had expressed this same educational outlook with respect to science education. For instance, Oppenheimer was critical of teaching science to undergraduates using historical methods or case studies, in particular, the views of James Conant (president of Harvard University and a director in the Manhattan Project). For Oppenheimer, science teaching "is best when it is more like an apprenticeship" since an element of action is inseparable from understanding. One must participate in science if one is to truly benefit from science. Perhaps an analogy between science and athletics is helpful. What one learns or obtains by being an athlete (e.g., physical strength, self-confidence) cannot be learned or obtained by being a spectator or even studying the history of athletics. One learns or obtains these things by doing athletics (science) or ideally by becoming an athlete (a scientist).

In his talk "The Tree of Knowledge" at the meeting of International Press Institute, Oppenheimer extended his recommendations to the press since they are part of the solution of "our cognitive predicament" as well. Oppenheimer described the press as "a group of men who have a singularly critical destiny in these rather peculiar times. … to keep the channels of truth and communication open and to keep men in some sense united in common knowledge and common humanity."[74] In his talk, Oppenheimer spoke of some of the "traps" that the press faces when covering science (e.g., the use of very large numbers as well as technical terms like "relativity" sounding like ordinary words).

However, he reminded them that even though it is difficult, if not impossible, to communicate the fundamentals of sciences far removed from common experience, say atomic physics or the theory of relativity, the press has successfully communicated practical applications of these sciences such as atomic power generation and the use of vaccines to prevent diseases. Further, sciences like the psychological sciences are not so far removed from common experience, and many of their fundamental findings can be understood by the public. Moreover, by presenting a "faithful image" of the cognitive challenges we confront, such as the threat of specialization to cultural coherence and the need for "some true apprenticeship," the public

press could do a great deal to alleviate our situation. Also, Oppenheimer held that part of the solution to our cognitive predicament "lies with just learning to live with it."[75] At the end of this talk, Oppenheimer briefly discussed the topic of nuclear disarmament.

Oppenheimer's two 1957 talks, "Nuclear Power and International Relations" at the Princeton NATO conference and "The Environs of Atomic Power" at the meeting of the American Assembly, were very different from the two talks discussed above since they did not concern themselves with "our cognitive predicament" and the resulting cultural crisis. Excluding nuclear power generation, their main concern was "a very grim one" — nuclear weapons and defense policy. Oppenheimer said that those who "know our stockpiles are terrified by them [and] everybody is terrified by estimates and assessments of Soviet capabilities. Total nuclear war has begun to take on that desperate, perhaps genocidal, perhaps suicidal, quality which was anticipated from the beginning."[76]

In these talks, Oppenheimer discussed four strategic endeavors given the current nuclear world — disarmament, defense, deterrence, and limitation. All are interrelated, "in part conflicting, and in part complementary."[77] In his Princeton NATO talk, Oppenheimer expressed skepticism about disarmament given the current world situation and problems inherent to nuclear disarmament (e.g., rapid, ongoing changes in nuclear technology). To prevent all-out nuclear war at this time, Oppenheimer saw the need for civilian defense as well as the defense of retaliatory forces necessary for a credible deterrence. However, our overall strategy today must be based on *limitation*. For Oppenheimer, "We need to be able to fight limited war, conventionally if we can, limited nuclear war if we must; and we need to be prepared for these things ahead of time . . . ."[78]

These realistic talks about "a very grim" subject validate Thorpe's interpretation that Oppenheimer "in significant ways … internalized the culture and mentality of the national-security state." However, there are elements here that validate McMillan's interpretation of Oppenheimer as a "moderating voice." In the question-and-answer session following his Princeton NATO talk, Oppenheimer offered support for NATO adopting a retaliation-in-kind policy and alluded

to support for a no-first-use policy with regard to nuclear weapons.[79] In his American Assembly talk, Oppenheimer said that to limit the proliferation of nuclear weapons the most important step that the United States can probably take "is to share our responsibility for their use with our allies abroad, and to make such weapons as effectively available as full partnership in the alliance might require."[80] More important, Oppenheimer did not dismiss nuclear disarmament for "there is a very great anxiety, surely on both sides, which lends some weight to discussions of disarmament."[81] For him, disarmament "is desirable, but only in connection with vast changes in the world, some of which have to do with international cooperative development, others … with the maintenance of international order, and some … with the establishment of some minimal elements of transnational power."[82]

As in his other two works, Oppenheimer concluded these two talks with the same hope and vision centered on intimate specialized, international communities — "the people who know how to build dams … , the people who know something about subatomic physics, the people who know about malaria." These epistemic communities involve "knowledge of" and "knowledge how" and are not limited to pure scientific communities. Having previously mentioned international efforts like CERN (European Organization for Nuclear Research) and EURATOM (European Atomic Energy Commission), Oppenheimer also spoke of the future of industrial atomic power, and even "a destiny and a duty of NATO," saying that these will play their parts "in creating those communities, those true elements of federation, and that pattern of new order which will some day have to encompass this earth, if we are to live with the great new powers we have acquired."[83] The conclusions of these four talks demonstrated Oppenheimer's continuing faith in international communitarian pluralism supported by scientific internationalism.

At this point, it might be helpful to summarize and attempt to put things in perspective. The hope and vision with which Oppenheimer ended his four talks of 1957–59 are concerned with breaking the "grip" of nationalism, fostering international institutions and endeavors, and preventing such disasters as nuclear war. However, as seen in

the above discussion, this vision is embedded in a broader, more detailed, vision. Later in Chapter 4, it will be argued that Oppenheimer accepted this overall hope and vision of 1957–59 as the fruition of his intellectual and philosophical efforts to understand contemporary science and society as well as providing means and recommendations for confronting and possibly transcending the nuclear revolution.

In addition, Oppenheimer's overall vision, like the more focused one, is secular and naturalistic. This should not be taken to imply that he was hostile to religious traditions. In fact, he made use of them in his public presentations and probably in his own self-understanding. Consider the following from Oppenheimer at the opening session of the 1960 conference "Progress in Freedom," which was held in Berlin and sponsored by the Congress for Cultural Freedom.

> If I cannot be comforted by Vishnu's argument to Arjuna, it is because I am too much a Jew, much too much a Christian, much too much a European, far too much an American. For I believe in the meaningfulness of human history, and of our role in it, and above all of our responsibility to it.[84]

This revealing statement combines the ecumenical, secular, and progressive. The argument of the Hindu god Vishnu mentioned here (in which Oppenheimer "cannot be comforted") comes from the *Bhagavad Gita*, and contends that Prince Arjuna should engage in fratricidal combat since it is "a simple and necessary duty, whose performance would preserve the way of Arjuna's salvation, and whose evils were of not deep meaning, either for him or for those whom he might kill."[85]

Oppenheimer's vision is also humanistic, pluralistic, and centered on the cognitive and the communal. Its major emphasis is coherence, especially cultural coherence. Moreover, Oppenheimer's vision is partial and open-ended, and at least on a first reading, not "grand" like Marxism or Manifest Destiny, or even Market Fundamentalism. However, his vision is grounded by its emphasis on science, which for him is the force shaping the modern world. Further, science-as-craft is a way of life founded in community which offers enrichment at the

personal level and internationalism at the collective level. His vision also provides advice and direction at various points. For instance, individuals have a dual duty centered on specialization and openness, educators need a curriculum based on practice and mastery of a discipline, and the press has obligations for promoting a viable public sector.

Central to Oppenheimer's vision are "the fraternal communities of men embarked on specialized work." The ideal here is the scientific community, like the community of subatomic physicists, but Oppenheimer quickly extended them to include other communities — for example, communities based on technological goals like the extirpation of malaria. He even extended them to include communities like the legal community. These specialized, epistemic communities are grounded by practice and tradition, and are robust since they are not defined simply by conventional agreement. They are defined by human need and commitment with success dependent on understanding the natural world and its limitations. Given that many are international, such communities are "true elements of federation" and are legitimate and natural objects of loyalty and commitment. They lead us in the right direction and provide tools for that new pattern of international order necessary to break the "grip" of nationalism and for us to survive in "this unprecedented period in the history of man."

In 1945, as will be stressed in the Chapter 5, Oppenheimer saw the atomic bomb as a "great peril" and a "great hope." Likewise in his overall vision set forth in the 1950s, Oppenheimer saw specialization as a "great peril" and, when properly understood, a "great hope."

Philosophy and the Public Sphere

Oppenheimer's vision, though strongly rooted in science, is not a scientific vision let alone a form of scientism. To see this most clearly, it is helpful to focus on his views of professional philosophers and the public sector. Remember, in his 1958 talk "The Tree of Knowledge," Oppenheimer addressed the press giving them advice and encouragement for their crucial contribution of keeping the channels of truth open and maintaining a viable public sector. In contrast, in a 1959

talk, Oppenheimer rebuked professional philosophers for removing philosophy from the public sector.

Oppenheimer's critique of professional philosophy carried special weight here. He was certainly aware of current philosophical thought, and had at least some limited philosophical interactions with professional philosophers. But most important, Oppenheimer was an Overseer of Harvard College and a member of the Visiting Committee for its philosophy department (as well as its physics and chemistry departments). He was elected Overseer in 1949, and his first appointment included being chairman of the Visiting Committee to the Philosophy Department, a position he held until 1955. This brought him in direct contact with senior members of the philosophy department concerning issues ranging from faculty appointments to the role of philosophy in general education.[86]

Oppenheimer's talk, "In the Keeping of Unreason," was delivered at a seminar in September 1959 and later published in the *Bulletin of Atomic Scientists*. This week-long seminar, which was held in a hotel on the banks of the Rhine a few miles from Basel, Switzerland, was sponsored by the Congress for Cultural Freedom and entitled "Industrial Society and the Western Political Dialogue." Some twenty intellectuals from ten countries participated including Raymond Aron (1905–1983), Michael Polanyi (1891–1976), and Bertrand de Jouvenel (1903–1987) as well as specialists in philosophy, economics, and law.[87] Interestingly, Oppenheimer's 1957 Princeton NATO talk "Nuclear Power and International Relations" was apparently a background paper for the Basel seminar.

In his talk, Oppenheimer touched on several ideas from his earlier works — the difficulty of communicating the insights of science, the sciences as "a plural and multiple reflection of reality," and specialization as providing a deep sense of knowledge and ignorance (i.e., second-order knowledge). His focus, though, was the health — really the lack of health — of our "common discourse" or public sector. In his introductory remarks, he said his concern was not simply with the hope of a revival of political philosophy, but with the hope of a revival of all philosophy.[88]

For Oppenheimer, the "image of the public sector has suffered" due to its enormous size as well as the rapid change of the circumstances

of our lives and the growth of mass culture, especially in the United States, where "production for consumption's sake has reached a kind of completeness." In addition, our common discourse has suffered from "an alienation between the world of science and the world of public discourse." This has not only "impoverished" public discourse but has "intimidated" it as well, and has denied it "an element of legitimacy and has given it a kind of arbitrary, unrooted, unfounded quality."

In advancing these ideas, Oppenheimer made the distinction between propositional and thematic discourse, which he first introduced (on my reading of his works) in his James Lectures. Propositional discourse is concerned with assertions "verifiable by the characteristic methods of science." Thematic discourse is "not best construed, though it can occasionally be construed, as assertions of fact about the natural order or the human order. It is best construed as assertions of experience, of dedication, of commitment" as well as concerned with the relatedness and priority of things. Moreover, thematic discourse "is the typical [and for the most part, proper] function of the public sector of our lives, which is where law arises, morality, and the highest forms of art."

Now, especially when not properly understood, science can intimidate the public sector by calling into question the legitimacy of thematic discourse. For example, an aggressive scientism (like logical positivism) might hold that only propositional discourse, as demonstrated by the success of science, is meaningful. Hence, thematic discourse would be "nothing but arbitrary decision" or the expression of emotive attitudes. Even given that thematic discourse is not "verifiable by the characteristic methods of science," Oppenheimer rejected such a view since in thematic discourse things can be analyzed, clarified, and explored as well as "subject to some logical surgery" and put into order.

The public sector and thematic discourse are also vulnerable since philosophy, once the "queen" of common discourse, has lost its way. Modern professional philosophy has overemphasized "the role of certitude" and hung "around its neck that dread, dead bird, 'How can you be sure?'" This has not only "stunted philosophy" but has in large part removed it from the public sector.

This absence of a public philosophical discourse not only impoverishes individuals and communities, but it is also dangerous. Oppenheimer revealed that he was profoundly anguished "over the fact that no ethical discourse of any nobility or weight has been addressed to the problem of the atomic weapons." And he raised the question "What are we to think of such a civilization, which has not been able to talk about the prospect of killing almost everybody, except in prudential and game-theoretic terms?" He dismissed people like Bertrand Russell who advocated World Government and a simple move to disarmament saying "these people want heaven and earth" and say "if we behave in a nice way, we will never get into any trouble." For Oppenheimer, this is "not ethics" because "They are not in any way talking about deep ethical dilemmas, because they deny that there are such dilemmas."

Oppenheimer then took his audience back to 1945 (presumably, the decision to use the atomic bomb against Japan and early discussions related to the Acheson–Lilienthal proposal for the international control of atomic energy) and 1949 (presumably, the debate over the American response to the Soviet Union acquiring the atomic bomb, and in particular the hydrogen bomb controversy), lamenting that "there have been crucial moments in which the existence of a public philosophical discourse, not aimed at the kind of proof which the mathematicians give, not aimed at the kind of verifiability which the biologists have, but aimed at the understanding of the meaning, of the intent, and of the commitment of men and at their reconciliation and analysis, could have made a great difference in the moral climate and the human scope of our times."

Oppenheimer's concern for the viability of the public sector or public sphere, to use a term made famous by the social philosopher Jürgen Habermas, is central to his overall vision. His call here is not merely to put in place mechanisms for "intellectual exchange present in the notion of a 'marketplace of ideas,'" but it is a call also for embodied processes for "forming otherwise private people into a public" capable of communication and cultural coherence.[89] What makes a view or opinion public "is not merely the accident of its popularity but also its accessibility and ability to withstand public

scrutiny."[90] Oppenheimer's call appealed to the crucial roles of educators, journalists, and professional philosophers as well as the dual duty (specialization and openness) of the individual.

For Oppenheimer, as for Habermas, the public sphere and the possibilities for cultural coherence have a history. The worlds of the ancient Greek *polis* and of eighteenth-century Enlightenment Europe are very different from the modern world of mass media and, most importantly, of atomic weapons. With the symbolic potential of postwar attempts for the international control of atomic energy (e.g., Acheson–Lilienthal proposal) and such means as specialized communities for breaking the "grip" of the nation state, Oppenheimer's hope and vision addressed not only cultural coherence but addressed the nuclear revolution itself.

In the next two chapters, our exploration of Oppenheimer and his thought continues by turning to the Pulitzer Prize-winning poet Archibald MacLeish and Nobel Prize-winning physicist I. I. Rabi. The focus is the interactions between Oppenheimer and these two men with whom he was intellectually engaged.

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Chapter 3

MacLeish, Oppenheimer, and "The Conquest of America"

Background

When Archibald MacLeish's essay "The Conquest of America" appeared in the August 1949 *Atlantic Monthly*, it provoked considerable comment in American newspapers, and even a response in *Pravda*. When this Pulitzer Prize-winning poet chose his provocative title, he could not have known that the Soviets would test their first atomic bomb in the same month that his essay appeared. But this ominous event, which broke America's atomic monopoly and gave rise to the hydrogen bomb controversy, provided his essay a deeper resonance.

He received complimentary letters from people such as McGeorge Bundy, at that time a Harvard professor and member of the Council on Foreign Relations ("I think your piece in the August *Atlantic* is magnificent …"); Harold Ickes, Secretary of the Interior from 1933 to 1946 ("You have done excellently a job that needed to be done …"); and Robert Hutchins, chancellor of the University of Chicago ("Your article in the *Atlantic* is wonderful.").[91] MacLeish also received a glowing letter from Adlai Stevenson, at that time governor of Illinois and the future Democratic Party nominee for president in 1952 and 1956 ("Thanks — for the fifth copy of your much discussed piece. All my friends have sent it to me, but I had not expected one from the author himself — and with what an inscription! … From all I hear it has attracted more attention than anything you have written for some

time … ."). MacLeish's inscription was "Adlai my boy: I salute you! I revere you! Goddam but I love you. Archie." Stevenson reciprocated by closing his letter with "My love to you both [Archie and his wife Ada]."[92]

Most important, MacLeish received praise from Oppenheimer as well: "I had seen it [the essay] with delight and read it more than once not only with gratitude but with attention."[93] But Oppenheimer also presented MacLeish with a challenge when he responded to its intellectual core — namely, MacLeish's "Revolution of the Individual."

The focus of this chapter is Oppenheimer's 1949 response and challenge to MacLeish. In the next chapter, the focus moves to Oppenheimer's 1962 response and challenge to his close friend I. I. Rabi and his views on education. These two responses and challenges flank what was designated in the previous chapter as Oppenheimer's hope and vision of 1957–59, and thus provide points of reference for addressing questions of development and content of his philosophical outlook. Just as significant, MacLeish's and Rabi's views serve as insightful means for comparing and contrasting Oppenheimer's outlook with those with whom he was intellectually engaged.

MacLeish was born in 1892 in Illinois. His father was a successful dry goods merchant and his mother was a college professor and educational leader who developed a deep sense of social responsibility in her children. From 1911 to 1915, MacLeish attended Yale University where "he majored in English, wrote poetry, and was heavily involved in campus literary, social, and athletic activities."[94]

MacLeish married in June 1916, but was confronted with a difficult decision less than a year later when the United States declared war on the Central Powers (e.g., Germany). He decided to join the American Army in June 1917 and served, along with other duties, as an artillery officer in France. MacLeish was shocked by the death of his younger brother Kenneth, who was a pilot shot down and killed shortly before the end of the war. Like many writers of his generation, MacLeish was embittered and came to see World War I as "an enormous fraud and fabrication; … nothing but a commercial war."[95] After the war, MacLeish graduated at the top of his class from

Harvard Law School and quickly went on to teach and become a successful lawyer.

However, in September 1923, he and his wife headed for Paris and would not return to the United States until 1928. MacLeish having published his first volume of poetry during the war now hoped "to become an accomplished poet" and his wife Ada "a professional singer." During this time, "they joined the expatriate literary community, meeting writers such as E. E. Cummings, John Dos Passos, Scott and Zelda Fitzgerald, James Joyce, and Ernest Hemingway."[96]

MacLeish flourished and became, to say the least, "an accomplished poet" as well as an accomplished playwright. He won his first Pulitzer Prize for poetry in 1933 and another in 1953, and yet another for drama in 1959. He was Boylston Professor of Rhetoric and Oratory at Harvard University from 1949 until his retirement in 1962. Elected in 1946 to the American Academy of Arts and Letters, he served as its president from 1953 to 1956. MacLeish was honored with the Presidential Medal of Freedom in 1977 and the National Medal for Literature in 1978. He died in Boston in 1982.

Most twentieth-century American poetry that concerns itself with political subjects assumes an adversarial stance toward the political center by challenging its authority, values, and decisions. MacLeish stands out as one of the few major poets consistently interested in articulating and shaping the values of that center along with defending its legitimacy. Moreover, he was the only major poet who belonged to the center. He worked for Henry Luce's *Fortune* magazine and became its most prolific writer during the 1930s. He admired and became a vigorous supporter of Franklin Roosevelt, and even wrote speeches for the president. In government, he served as Librarian of Congress (1939–44), Assistant Director of the Office of War Information (1942–43), Assistant Secretary of State (1944–45), and Chairman of the American Delegation to the UN Conference in London that founded UNESCO in 1945.

Like Oppenheimer, MacLeish became a target for political attack. The FBI maintained a thick file on MacLeish, and he was labeled a "fellow traveler" and "pink" by voices on the Right and even an "unconscious fascist" by voices on the Left. Fortunately, he never

faced the brutal attacks and public humiliation that Oppenheimer suffered. Nevertheless, as his "Conquest of America" demonstrates, MacLeish did not hesitate to confront the anti-communist hysteria of his time as well as Joseph McCarthy and his minions.

In all likelihood, MacLeish and Oppenheimer came to know each other in the 1940s, though it is difficult to trace the precise origins of their friendship. The MacLeish and Oppenheimer Papers at the Library of Congress include several letters that the two exchanged. The earliest run from September 2 to October 15, 1948, and concern MacLeish's attempt to enlist Oppenheimer as a signatory to a petition opposing the decision of the Board of Superintendents of the New York City Schools to remove *The Nation* from public school libraries.[97] In an intriguing letter from February 1949, Oppenheimer wrote to MacLeish that he and his wife Kitty "were touched and pleased" by some poems MacLeish had sent them and noted that Kitty "felt rightly the need" for MacLeish's bitter poem "Brave New World," which she had read on the evening of President Truman's inaugural. Oppenheimer concluded, "Do come and see us when you can. Professor Bohr is not here [at the Institute for Advanced Study] this semester; and you need not fear long midnight walks through the snow."[98] This language suggests a close social relationship, as well as interesting conversations among MacLeish, Oppenheimer, and Bohr.

Later letters include a 1954 letter with MacLeish's condemnation of the recent AEC hearing of Oppenheimer and the revocation of his security clearance: "I can't wholly restrain the push of my own feelings and certainly not the push of Ada's. Like so many others we suffered personally through the whole ordeal as though something intimately valuable to us was being hurt — as indeed it was — and we came out at the end feeling, as every decent human being must feel, that a terrible wrong had been perpetrated but that a very great spirit has been revealed also …"[99] Other letters consist of MacLeish's inviting Oppenheimer to participate in an Eliot House seminar at Harvard as well as Ada's letter to Kitty in November 1954, indicating an enduring friendship between the two couples. One final brief letter from MacLeish to Oppenheimer dated September 2, 1965

indicates that their friendship lasted until then, and probably until Oppenheimer's death in 1967. The most important letter for us, dated September 27, 1949, is Oppenheimer's response to MacLeish's essay "The Conquest of America."

The Conquest of America[100]

In their Pulitzer Prize-winning *American Prometheus*, Kai Bird and Martin Sherwin devote slightly less than one page to MacLeish's "Conquest" and Oppenheimer's reply. They highlight some of the central ideas found in it as well as Oppenheimer's response, and characterize "Conquest" as "an astonishing bitter essay." Yet it is also a window into the evolution and content of the thought of both MacLeish and Oppenheimer.

At the time MacLeish wrote "The Conquest of America," he was worried that the 1940s were turning out like the 1920s. Like many writers and intellectuals of his generation, MacLeish was disillusioned by World War I and its aftermath. As early as 1942, MacLeish was arguing that victory against the Germans and Japanese must not result in the "misery, the economic dislocation, the inane prosperity followed by the meaningless hunger of the victory we won before [in World War I]."[101] Similarly, in 1943, MacLeish wrote that after our victory in World War I, "we left the future to the laws of economics to construct. And we … recall a future that should have been peace and freedom and became the radio, the automobile, and the depression of 1929. … you do not fight a war for the privilege of … becoming the world's most numerous consumers and thereafter the world's most numerous unemployed."[102]

So there was a real danger that victory in World War II might come to mean no more than victory in World War I had meant. Nonetheless, for MacLeish as well as Oppenheimer, there was, at least initially after World War II, an enormous opportunity to re-make the world with America taking the lead, an opportunity embodied most palpably in the United Nations and UNESCO and the prospects for international cooperation which they entailed. Although MacLeish never went as far as One-Worlders like Einstein and Russell in calling

for the establishment of an actual world government, he imagined a very strong, proactive UN and was deeply disappointed when Cold War rivalries vitiated that possibility — hence, the bitterness in his 1949 essay. More pointedly, "Conquest" presents an alarming diagnosis of America based on betrayal and failure resulting in historic danger. Thankfully, the essay ends with an affirmation and a prognosis of hope since "the cock has not crowed for the second time."

To capture the reader's attention, MacLeish begins his essay by speculating about what might be written by somebody, most likely a historian, in the 1980s about "the conquest of the United States by the Russians." The conquest would not be a military conquest, but a conquest of ideas and spirit. The hypothetical diagnosis would commence with an indictment — in the late 1940s, America, the most powerful nation the world has ever known, surprisingly defined itself negatively not positively. It defined itself by what it was against, not by what it was for. The American people lost their way and "wandered into the Russian looking-glass, primarily because [they] were unable to think." American foreign policy became "a mirror image of Russian foreign policy: whatever the Russians did, [they] did in reverse." In America, "no proposal could be enacted, from a peace plan at one end to a military budget at the other, unless it could be demonstrated that the Russians wouldn't like it." Moreover, "Even religious dogma was Russian dogma turned about: the first duty of a good Christian in the United States in these years was not to love his enemies but to hate the Communists."

Regrettably, the Americans did not "understand the nature of the crisis in which [they] were caught or the character of the role [they] were called upon to play." They took Communism as "a great new revolutionary force" and "the way to resolve the crisis, therefore, was to resist and contain and presumable strangle the Communist revolution." But for MacLeish this was "a delusive belief" since the rise of Communism did not precipitate the crisis. It was simply a consequence of a deep and fundamental crisis in civilization and culture, and even the condition of man. They were blind since "the true revolutionary force" which began in the eighteenth century was then centered in America not Russia. By chaining itself to "the purposes and policies of a rival state," the "realization of the historic American

purpose" was "subordinated to the defeat of the Russian purpose," and the life of the American Republic and hence the true revolutionary force was betrayed.

For MacLeish, the so-called conflict between the right and the left was a false conflict. The real conflict and choice was between different worlds, namely, "all forms of authoritarianism," on the one hand, and "the dream of a whole and responsible human freedom" on the other. This conflict pits the forces of "world reaction, which preaches submission to authority, whether of a state or a man or a party or a church," against the forces of "world revolution," specifically the Jeffersonian "revolution of the individual." Authoritarian societies of both right and left permitted the individual to live only "through the life of the society as a whole," while the revolution of the individual promised to "create a society in which each can live as himself."

As warrant for his argument, MacLeish offered a model of human history in striking contrast to the Marxist model. In MacLeish's model, the "world" of authoritarianism, in which individuals are strictly defined by and find fulfillment only in the social order, peaks in the European Middle Ages. The Renaissance marks the first stirrings of a flowering of freedom that finds its first significant expression at the end of the eighteenth century, most powerfully in the ideas of the American Revolution. The "world" of authoritarianism is "dying" but "not altogether dead," while Jefferson's "new world" of individual freedom is "conceived but not yet born," and in the mid-twentieth century we find ourselves in "the interval between the two." Communism seeks to turn back "the current of human evolution to that decaying city of hierarchical and disciplined order," and is thus a reactionary rather than a revolutionary force in world history. The true evolutionary — or revolutionary — force is Jeffersonian individualism and democracy.

In his essay, MacLeish conceded that over the course of American history, Jeffersonian individualism and democracy have at times been "corrupted by hypocrisy and cynicism and selfishness." Moreover,

> Its articles of faith have been made the catechism of a faithless materialism. Its central concept of the dignity of the individual, grown

> cancerous on occasion, has swollen to the morbid and malignant figure of irresponsible and grasping power — the "rugged individual" whom some still think of as American.[103]

In spite of all this, the force of revolution so eloquently declared by Jefferson remains the living spirit of the American Republic: "Without it, the United States is so much land, so many people, such an accumulation of wealth. With it the United States is a stage upon the journey of mankind."

MacLeish was convinced that the United States had no choice but to arm itself and resist "Russian threats of force and Russian conspiracies." The trouble arose when this resistance "became an end and object in itself." By ceding its intellectual and moral independence to an authoritarian state, America had issued "a declaration of political bankruptcy such as few great nations in the course of history have ever confessed to." Though a policy of resistance was necessary, this resistance should have been only a means for moving ahead with the "American purpose" and providing "a positive and believable alternative to the grim choice the authoritarians [held] before mankind."

This failure may well turn out to be "the costliest blunder" in American history. From an American perspective, "the severest indictment of this generation of men and women will be the charge that we falsified the American image and thus undermined the spiritual integrity of the nation." But, for MacLeish,

> there will be other accusations from other quarters and some of them will be even harsher than our own. There will be the judgment of the men of conscience and concern and honest mind in every country who, when all the arguments are in, write down the verdicts. And what they will say of us will certainly be this: that we had it in our power at a critical moment in history, when the whole future of humanity hung in balance, to present a true and hopeful alternative to the iron choice with which the world was faced and that we did not do it; that we did not do it even though the true alternative was the course to which our whole past and our entire tradition had committed us; that instead of doing it we built a wall

> against one half the evil [communists and authoritarians of the left] but not against the other [fascists and authoritarians of the right], and made the wall still higher by tearing down for its construction some of the dearest of our own beliefs.[104]

In the final section of his essay, MacLeish reminds his reader that even though the American people have failed to act at this "moment of decision" and assert their "moral purpose," they "have not yet denied that purpose — the cock has not crowed for the second time." They have lost "momentum" and "initiative," but they "have not yet rejected [their] role as a revolutionary people moving with the great revolutionary current of history." Time is short; and "only by moral action, only by moral action at the highest level — only affirmative recommitment to the revolution of the individual" can America regain its "vital and creative impulse" and present to the world "a true and hopeful alternative."

Although MacLeish's "Conquest" was aimed at the specific conditions of the United States in 1949, many of the ideas and themes of this essay retained their validity in the coming decades. These lines from his 1960 "National Purpose," for example, could easily have come from "Conquest": "To engage, as we have over the past fifteen years, in programs having as their end and aim not an action to further a purpose of our own but *counter* action to frustrate a purpose of the Russians is to invite just such a state of mind [a loss of national purpose]. A nation cannot be sure even of its own identity when it lives its history in a mirror."[105]

Somewhat amazingly, in March 1980, the editors of *The Atlantic* re-printed "The Conquest of America" in its entirety as the lead article, along with a foreword by Robert Manning citing a *New York Times* headline on "containing" Moscow after the Soviet invasion of Afghanistan. Manning quoted MacLeish as conceding that he had been wrong in the original "Conquest" when he predicted that his hypothetical historian in the 1980s would be unable to understand why the world's most powerful nation in 1949 had "contracted its national will to the dry negation of the [Soviet] will." As things turned out, said MacLeish, the 1980s were just like the 1940s.[106]

Oppenheimer–MacLeish Exchange

MacLeish sent Oppenheimer a copy of "Conquest" along with a "warm note" apparently inviting him for his thoughts on the essay. In a letter dated September 27, 1949, Oppenheimer responded: "Long before that in California I had seen it with delight and read it more than once not only with gratitude but with attention. I am very, very glad that you wrote it and put it out."[107] Oppenheimer praised the first sections of "Conquest" where "the present state of affairs is portrayed against the anguish of the implication of how things ought to be." Oppenheimer remarked "This is masterful; you will not need to be told how it speaks my thought."

However, Oppenheimer wrote that he had "one worry which even the rereading has left." The trouble arose in the last section with MacLeish's insistence that "the revolution of the individual" as articulated by Jefferson is the "affirmation" needed for solving the Republic's ills and presenting the world with a hopeful alternative. Specifically, Oppenheimer was worried when MacLeish said "What was needed was a redeclaration of the revolution of the individual in terms which would have realistic meaning in this time."

Rather than overemphasizing "the emancipation of the individual from society," wrote Oppenheimer, MacLeish ought to acknowledge "with an awareness that the past one hundred and fifty years have rendered progressively more acute, the basic dependence of man on his fellows." Further, any account must reflect "the profound part that culture and society play in the very definition of human values, human salvation and liberation." Because "man is both an end and an instrument," wrote Oppenheimer, the "affirmation" that MacLeish called for in "Conquest" which certainly has to do with freedom must be "something far subtler than the emancipation of the individual from society." The affirmation that we need "in the present situation" ought to be "as surprising in its concreteness and its breadth as was Jefferson's, which bears to our familiar protestations of belief in the individual something like that of Jefferson to Condourcet."[h]

[h]Jefferson met and corresponded with Condorcet on several occasions, particularly between 1784 and 1789, when Jefferson was American Minister in Paris. At that time

Oppenheimer conceded that he could not articulate such an affirmation himself, but wrote that "because I think that there will be real novelty and real creation in what we have now to say and think and do, that I take a more tolerant attitude towards the confusions and fumblings of the last years." Oppenheimer reminded MacLeish of "the night you spent with Bohr" and wrote, "I think that Bohr's point is much too narrow to comprise anything like the whole of what we need to understand and to resolve. But in a narrow range it does have that new insight into the relations of the individual and society without which we can give an effective answer neither to the Communists nor to the antiquarians nor to our own confusions." Oppenheimer closed his letter by re-emphasizing his delight and gratitude to MacLeish for having written "Conquest" and his "conviction that it will help."

MacLeish replied in a letter dated October 6, 1949, stating, "It was extraordinarily kind of you to write me at such length. The point you raise is, of course, the central point of the whole business. I want to think about it and to write to you later."[108] There is no record (according to my research) of a later letter to Oppenheimer on this topic. Also, what Oppenheimer means by "Bohr's point" is uncertain, though one would expect that it involves Bohr's notion of "complementarity" as illustrated in atomic physics (the subject of Chapter 6) and its application to the tension between the individual and society.

This private exchange between Oppenheimer and MacLeish on America and its Cold War foreign policy is noteworthy on several levels. For one, it illuminates not only the intellectual landscape of that period, but even touches on contemporary discussions of the meaning of liberal democracy. Both men were members of the American political elite, highly placed in the formulation and articulation of US foreign and domestic policy, as well as public intellectuals who presented their ideas to a much broader audience. Moreover, in the last years, historians have turned their attention to the Cold War as an "ideological project." For example, in his 1996 "On Moral Equivalency and Cold War History," John Lewis Gaddis argues for

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Condorcet was among the intellectual leaders of the French Enlightenment, and he shared Jefferson's faith in the perfectibility of human nature.

the significance of "ideas, ideologies, and moral frameworks," and claims, "We have gone too far looking at the Cold War within a materialist framework devoid of moral content."[109] Oppenheimer and MacLeish bear this out. In addition, one can now point to the influence of the neo-conservatives in the George W. Bush administration and the so-called "War on Terrorism" as a painful reminder of the continuing importance of ideas and ideology.

More to the case at hand, this exchange demonstrates strong agreements between Oppenheimer and MacLeish — about opportunities lost and squandered after World War II, historic dangers confronting America and the world, American Exceptionalism, and the need for an American affirmation. Furthermore, this exchange has disturbing undercurrents by portraying a haunting image — though difficult to imagine a communist America, "it is easy to imagine what a fascist American would be like."[110]

Oppenheimer's critique and worry suggest several criticisms. For instance, MacLeish's revolutionary individualism immediately brings to mind the dangers of mass democracy as stressed by such intellectuals as author, journalist, and leading opinion-maker Walter Lippmann. In various circumstances and at different times, the American electorate like any electorate has proved to be fearful, unimaginative, materialistic, and intolerant as well as susceptible to propaganda and emotional stereotyping. A fatal weakness of democracy could be that "the people have acquired power which they are incapable of exercising."[111]

Moreover, MacLeish is obliged to expand on what he means by his "redeclaration of the revolution of the individual in terms which would have realistic meaning in this time." In "Conquest," MacLeish does say some things. One is a call for an energized New Deal — "liberate individuals from the degrading fear of unemployment or old age or sickness." And most important, with recent technological advances, "Even the greatest of the industrial obstacles to individual freedom — the mechanization of the machine-worker — could be removed if the freedom of the individual became the first business of society." By ending the age of the machine-worker, those who work would regain "a measure of their former manhood, their former

mastery." For MacLeish though, "The real obstacle is the obstacle of will, not method." Like always, freedom is "a hard choice," but today it takes a very different form — "For to choose individual freedom now is to choose, not a common struggle against the masters of an ordered world, but a lonely journey, each man for himself, across the ruin and the rubble which that world has left."

Nevertheless, MacLeish needed to say more about his affirmation especially, as Oppenheimer insisted, about "the basic dependence of man on his fellows" or, in other words, about the individual and community. However, Oppenheimer's "worry" was not simply about an omission in MacLeish's "Conquest" but was a deep reflection of Oppenheimer's communitarian inclinations and views which become more apparent in his hope and vision of 1957–59. When MacLeish spoke of the need for the "revolution of the individual" which today is "a lonely journey," Oppenheimer had reason to worry.

At the time of his 1949 letter to MacLeish, Oppenheimer clearly recognized that community would have an essential role in any adequate affirmation or vision. During the war and early postwar period, communitarian themes appeared in his discussions and writings about the international control of atomic energy. For instance, in his 1945 Los Alamos speech, Oppenheimer spoke of the "common [universal] problem" of atomic weapons as requiring "a complete sense of community responsibility" for its solution.[112]

More specifically, as will be highlighted in Chapter 5, Oppenheimer played a leading role in Acheson–Lilienthal Report that served as the basis for the US proposal to the United Nations for the international control of atomic energy. Proposing the "renunciation of national sovereignty" in the field of atomic energy, this report concluded saying "in the long term there can be no international control and no international cooperation which does not presuppose an international community of knowledge."[113] In addition, it was understood that science, with its international fraternity of scientists, served as a worthy prototype for such "an international community of knowledge." Therefore, efforts to constrain and possibly transcend the atomic crisis emphasized community rather than the individual.

Oppenheimer's worry about MacLeish's essay was also rooted in his early views on science and society. Central to Oppenheimer's early and continuing diagnosis and vision concerning science and society is the theme of community. His 1947 MIT lecture, "Physics in the Contemporary World," is perhaps best known for the remark that in developing the atomic bomb, "the physicists have known sin." Most important for us in this lecture, Oppenheimer addressed the subject of community when he spoke of "some of the features of the professional life of the scientist, which make it one of the great phenomena of the contemporary world." For him, science is "a way of life" — a form of craftsmanship — with "The true responsibility of a scientist [being] to the integrity and vigor of his science." Oppenheimer described science as a mode of action or doing that enriches its participants, but science is not an individualistic enterprise. Science is a "collective effort in which there is a clear and well-defined community whose canons of taste and order simplify the life of the practitioner."[114] In another essay, "The Age of Science," published a year after "Conquest," Oppenheimer described the institution of science as creating a great "harmony between the flourishing of the community and the liberation of the individual man."[115]

This communal view of science permeates Oppenheimer's early as well as latter works. MacLeish's "revolution of the individual" stood in sharp contrast to Oppenheimer's developing vision which emphasized the potential of community rather than the individual. Even more so, any adequate affirmation would have to contend with the tensions between the individual and community or, put more starkly, "the antinomy between the individual and the community."

Oppenheimer's Reith Lectures

In his 1949 letter, Oppenheimer told MacLeish that a simple "redeclaration" of Jefferson's "revolution of the individual" was inadequate because it failed to acknowledge the fundamental truth "that man is both an end and an instrument" and "the basic dependence of man on his fellows." Oppenheimer called for an "affirmation" that would be "far subtler than the emancipation of the individual from

society," but conceded, "None of this is to explain that I know what it is that should be our affirmation." Oppenheimer did offer suggestions and hints pointing to such an affirmation. He reminded MacLeish of "the night you spent with Bohr" and continued that "in a narrow range it [Bohr's point] does have that new insight into the relations of the individual and society without which we can give an effective answer … ."

With such suggestions and hints in mind, an intriguing place to look is Oppenheimer's BBC Reith Lectures entitled "Science and the Common Understanding," which he delivered in 1953 and later published in 1954. In these lectures, he discussed science as a cultural resource and developed Bohr's ideas on complementarity in atomic physics (e.g., wave versus particle descriptions of atomic systems) and their possible extension to other domains. Further, Oppenheimer referred to both Jefferson and Condorcet, like he did in his letter to MacLeish, and used phrasing (e.g., "We are at once instrument and end … ."[116]) quite similar to that of the letter. His sixth and final lecture, "The Sciences and Man's Community," appears directly related to what Oppenheimer took as a central part of any acceptable "affirmation." Consider the following.

> If we err today — and I think we do — it is in expecting too much of knowledge from the individual and too much of synthesis from community. … The individual event, the act, goes beyond the general law. … And we as men are not only the ingredients of our communities; we are their intersection, making a harmony which does not exist between the communities except as we, the individual men, may create it and reveal it. … We are men because we are part of, but not because only part of, communities; and the attempt to understand man's brotherhood in terms only of the individual man is as little likely to describe our world as is the attempt to describe general laws as the summary of their instances. These are indeed two complementary views, neither reducible to the other, no more reducible than is the electron as wave to the electron as particle.[117]

From this, one can propose that an acceptable affirmation for Oppenheimer at this time would be two-fold. First, what Oppenheimer

referred to in his Reith Lectures as "the antinomy between the individual and the community" should be expected since such oppositions are found in other areas and, in particular, atomic physics. Further, as complementarity in atomic physics illustrates, sometimes oppositions can be transcended — not through theoretical re-description but through something like choice or action. Therefore, it is an overreaction and hence a mistake to attempt a universal description of man either as a fully emancipated individual or as merely a part of a fully cohesive, single community. However, this antinomy between the individual and the community can be mitigated and perhaps transcended, for man reaches his potential only in a diversity of open communities connected with the past and committed to action in the present. Coherence between communities requires a unity of men brought about by action and dialogue.

Similarities between Oppenheimer's Reith Lecture and his hope and vision of 1957–59 as set forth in such later works as "Science and the Human Community" and the James Lectures are evident. Nevertheless, there are differences. In the Reith Lectures, there is no reference to the need for strong international communities to break the "grip" of nationalism. Further, in the later works, there is greater emphasis that knowledge is more of a property of specialized communities (i.e., a kind of "cognitive syndicalism") rather than of individuals.

A plausible interpretation here is that in 1949 Oppenheimer had a definite grasp of what an acceptable affirmation or vision would be like, but was still trying to formulate it in his own mind. This was reflected in his general works on science and society as well as exchanges and interactions with others like MacLeish. For Oppenheimer, fundamental problems cluster around "the antinomy between the individual and the community," and with the Reith Lectures he believes that he has made definite progress.

This interpretation is supported by an exchange of letters between MacLeish and Oppenheimer. In a letter dated June 21, 1953, MacLeish sent Oppenheimer a poem on the subject of science which he had been "working off and on in lighter moments." The poem was "a kind of bastard sonnet with two octets (like a cow

with eight tits) but only one sextet (to catch the milk)." MacLeish's sonnet presents a caricature of science as reductive and limited, like a "simple saint" incapable of asking "Why?" since "Her devotion is to tell by rote her rosary of perfect answers."[118]

MacLeish wrote again on November 14, asking, "Don't you ever acknowledge poems dedicated to you?"[119] By happenstance, Oppenheimer had arrived in London that November, and his Reith Lectures were broadcast during November and December. Oppenheimer finally replied in a note dated July 15, 1954: "Your eight titted sonnet is still in my desk drawer; and when I had your note of November, I had the thought, if not the heart to answer '( )'. At this late day that no longer seems so heartless, in part perhaps because I did get the reasons of [on] record in the BBC lectures."[120]

Interestingly, Lloyd Garrison who was Oppenheimer's lawyer during the 1954 security hearing introduced the Reith Lectures as an exhibit. The purpose was to show that Oppenheimer's "views on the freedom of the mind and the human spirit" were inconsistent with communism and "could not be tolerated for one moment behind the Iron Curtain."[121] In fact, Garrison quoted and placed into the record a long excerpt from the sixth and final lecture. In this excerpt, Oppenheimer speaks of open access to knowledge as a fundamental mark of freedom as well as resolving "difference by converse, and, where converse does not unite, to let tolerance compose diversity." The excerpt continues

> This would appear to be a freedom barely compatible with modern political tyranny. The multitude of communities, the free association for converse or for common purpose, are acts of creation. It is not merely that without them the individual is the poorer; without them a part of human life, not more nor less fundamental than the individual, is foreclosed. It is a cruel and humorless sort of pun that so powerful a present form of modern tyranny should call itself by the very name of a belief in community, by a word "communism" which in other times evoked memories of villages and village inns and of artisans concerting their skills, and of men of learning content with anonymity. But perhaps only a malignant end can follow the systematic belief that all communities are one community; that

> all truth is one truth; that all experience is compatible with all other; that total knowledge is possible; that all that is potential can exist as actual.[122]

Furthermore, in the hearing Oppenheimer stated that principal point of the lectures "was to indicate in what ways contemporary science left room for an integrated human community" and that specialized knowledge does not necessarily lead to fragmentation in society.[123] With this use of the Reith Lectures in the security hearing, Oppenheimer's vision that he presented to the public is shown to have connections, at least in general ways, with his views on national security and atomic policy.

Irrespective of the securing hearing, Oppenheimer is clearly taking his Reith Lectures as getting his "reasons [on] record" and can be seen as responsive to MacLeish and his "revolution of the individual." In spite of this, the public responses to Oppenheimer's Reith Lectures, both as delivered and published, were mixed and must have been disappointing to Oppenheimer. For example, though praised by one reviewer for "consummate clarity" and "beauty of expression that is very nearly poetic," the review in the *Economist* spoke of the reception to the lectures as "generally one of bewilderment and disappointment; apparently something different was expected from the man who had engineered the mightiest scientific experiment in history."[124] One reason for such reactions is that complementarity has a central role in the Reith Lectures which requires Oppenheimer to spend a large, perhaps inordinate, amount of time developing atomic physics as a prerequisite to his discussion of complementarity and its extensions. Further, complementarity can be a topic filled with confusion, and to some can appear trivial or obvious.

In 1989, Oppenheimer's Reith Lectures were republished in *Atom and Void: Essays on Science and Community*. In its preface, the physicist Freeman Dyson, friend and colleague of Oppenheimer at the Institute for Advanced Study, offers his take on the public reception to Oppenheimer's lectures. According to Dyson, "millions of listeners were baffled and disappointed." After Einstein, Oppenheimer was "the second most famous living scientist." He was "a prime

mover, first in the building of atomic bombs, second in the effort to establish international control on nuclear energy, and third in the political struggles that raged around the building of hydrogen bombs." These English listeners "expected hot news" and "dramatic statements about the great events and great issues of the day." Instead, Oppenheimer presented "a scholarly and impersonal discussion of the history of science" as well as "a rarified and philosophical view of the mysteries of quantum mechanics," and "a picture of the human predicament." Dyson continues, "Barely a word about the bomb. No answers to any urgent political questions of the 1950s. No glimpse of the inner world of action and power in which Oppenheimer had been living for the previous ten years. No wonder the listeners were scornful." But,

> Now, thirty-five years later, we can see that Oppenheimer chose his subject-matter wisely. He knew that any discussion of current events that attempted to be up-to-date would soon be out-of-date. He had no wish to give lectures that would cause a political sensation today and be obsolete tomorrow. He wanted to speak to the ages, to say something of permanent value. As a result, these lectures have stood well the test of time. They are as pertinent to our situation in 1989 as they were in 1953. The English listeners' loss is our gain.[125]

Dyson is clearly impressed by Oppenheimer's lectures. In any event, they definitely address enduring themes — the nature of science and the human predicament, and specifically "the antinomy between the individual and the community" — and were placed into the government record of Oppenheimer's 1954 security hearing.

MacLeish's Suspicion of Science

In October 1949, when MacLeish replied to Oppenheimer's letter critiquing "The Conquest of America," he said "The point you raise is, of course, the central point of the whole business. I want to think about it and to write to you later." Not only is there no letter

on record to Oppenheimer on this subject, but MacLeish simply does not engage "the central point of the whole business" in his later works whereas Oppenheimer does as illustrated by his Reith Lectures.[i]

Part of the reason might simply be that MacLeish has little to say here. On the other hand, his reticence may well be founded on his suspicions of science itself — a human endeavor and institution taken by some as the paradigm case of a progressive community of free individuals. For MacLeish, science is a kind of totalizing system — like Marxism — that claims privileged access to the truth, and thus threatens the premise of the "revolution of the individual" that each individual is entitled to determine the truth for himself. MacLeish's thinking on this issue predated his friendship with Oppenheimer by several years. In 1929, for instance, he argued that "the world centered about man was destroyed by the impulses which produced the world explicable by science. Men lost themselves. They ceased to know what they were, what they were for." MacLeish urged "The restoration of man to his position of dignity and responsibility at the center of the world — not at the center of one of the arbitrary worlds of science … ."[126] In 1944, he made the same point: "we have lost our sense of the place of man in the universe."[127]

And in his 1968 "Master or Man," where he speaks of his late winter evening at Princeton that he spent with Bohr, MacLeish expanded on his claims, arguing that a "world autonomous in its economic laws, as the Marxists hoped, or autonomous in its scientific surge, its technological compulsions, as some in the West began to fear,"

[i]This is not to say that MacLeish never mentions the tension between the individual and community. For example, in his 1955 "The Alternative," which is a highly critical review of Walter Lippmann's *The Public Philosophy*, MacLeish writes "What motivates Mr. Lippmann is the conviction that the idea of full individual freedom and the idea of effective community are irreconcilable ideas and that there is therefore an ineluctable choice between them: that in that choice community must be preferred. He is unwilling or unable to believe that no such painful choice may be necessary: that full individual freedom may conceivably lead to a community of its own, effective in a new and different way." (MacLeish, *A Continuing Journey* (ref. 105), p. 155). MacLeish has an interesting thesis here but he does not develop it.

undermined the idea that man can create whatever world he imagines.[128] He went on to elaborate,

> Prior to Hiroshima, it had still been possible — increasingly difficult but still possible — to believe that science was by nature a human tool obedient to human wishes and that the world science and its technology could create would therefore be a human world, reflecting our human needs, our human purposes. After Hiroshima it was obvious that the loyalty of science was not to humanity but to truth — its own truth — and that the law of science was not the law of the good — what humanity thinks of as good, meaning moral, decent, humane — but the law of the possible.[129]

MacLeish concluded that the American Proposition — that men can, and by right ought to, govern themselves — "faltered with our failure to control the greatest and most immediate of human dangers. We began to see science as a kind of absolute beyond our reach, beyond our understanding even; known, if it was known at all, through proxies who, like priests in other centuries, could not tell us what they knew."[130] For MacLeish, science is clearly not a case, let alone the paradigm case, of a progressive community of free individuals.

There is an element of irony here perhaps unbeknownst to MacLeish. Near the end of the war with Japan, there were senior officials (e.g., Secretary of War Henry Stimson and Acting Secretary of State Joseph Grew who had been the ambassador to Japan) in the US government and military who supported clarifying and possibly reinterpreting the unconditional surrender terms for Japan. In particular, retention of the Emperor was recommended to help shorten the war and perhaps avoid a costly invasion of the Japanese homeland as well as assist with the postwar occupation of Japan.

In 1945, while assistant secretary of state for public and cultural affairs, MacLeish along with Dean Acheson, then assistant secretary of state for congressional relations, opposed such significant changes in the policy of unconditional surrender. They warned of "a strong public and congressional reaction against any proposal for retaining the Emperor."[131] Today, several historians like Gar Alperovitz and Martin Sherwin contend that if the United States had made it clear

that the institution of the Emperor would be retained, Japan might have surrendered before a costly invasion and, in all likelihood, before the atomic bombing of Hiroshima. Unaware of the atomic bomb project, MacLeish had unwittingly made a small but not insignificant contribution to the atomic attacks.

Of course, MacLeish's (and Acheson's) "bureaucratic responsibilities for public and congressional relations are enough to account for their opposition to any public pledge to spare the throne [of the Emperor]."[132] But a suspicion remains — MacLeish's worry that victory in World War II might come to mean no more than victory in World War I. With the end of the war, America would take the leading role in remaking the world and there must be a peace "which alone will justify this war."[133]

In a July 1945 memo to Secretary of State James Byrnes who strongly opposed retention of the Emperor, MacLeish, who had little or no expertise in Japanese affairs, warned "what has made Japan dangerous in the past and will make her dangerous in the future if we permit it, is, in large part, the Japanese cult of the emperor worship which gives the ruling groups in Japan … their control over the Japanese people."[134] Surely, MacLeish's deep-seated faith in Jeffersonian individualism and democracy as exemplified in his "revolution of the individual" — a revolution against "all forms of authoritarianism," both the left and the right (monarchy, aristocracy, fascism) — reinforced, and possibly shaped, his opposition to retaining the Emperor.

In drawing this chapter to a close, keep in mind that as public intellectuals in 20th Century America, MacLeish and Oppenheimer serve to illuminate the Cold War as an "ideological project." Both held that we must define ourselves by what we are for, not against. MacLeish turned to the past and used Jeffersonian individualism and democracy as a springboard to the future. In the crisis of atomic energy with its great peril and great hope, Oppenheimer turned to the communal nature of science and the image of scientific internationalism.

However, MacLeish never really addressed "the central point of the whole business" — "the basic dependence of man on his fellows" as epitomized by "the antinomy between the individual and the community" — whereas Oppenheimer not only addressed it but

embraced it as illustrated by his Reith Lectures and his later hope and vision. An underlying reason for this difference surely lies in the defining experiences of their lives — as artist and as scientist. MacLeish's life as a poet is a life that exemplifies the individual not the community — hence his "revolution of the individual." Oppenheimer's life as a physicist is a life that exemplifies both the individual and the community; and this is a key, perhaps the key, to his thought. As he said in his 1950 article "The Age of Science," the human institution of science "makes for so great a harmony between the flourishing of community and the liberation of the individual man."

Oppenheimer's themes concerning the individual and community extend well beyond science and its applications. During the first of his William James Lectures, delivered at Harvard University in 1957, Oppenheimer spoke briefly of "one of the great roles of the arts" — namely, that art "alters and extends what people can see, what they can perceive, and above all alters and extends what people can see with a certain community, as a whole group of people and not individually."[135] MacLeish, then a professor at Harvard, was likely in attendance; but in any case, he would almost certainly have agreed.

In his essay "The Conquest of America," MacLeish called for "a redeclaration of the revolution of the individual" and emphasized the importance and necessity of images, saying that "The soul of a people is the image it cherishes of itself … ."[136] On December 24, 1968, nearly two years after Oppenheimer had died, the Apollo 8 astronauts orbiting the moon became the first humans to see and photograph Earth in the vast void of space. On Christmas day on the front page of the *New York Times*, MacLeish proposed that this photograph has given us a new image.

> Formed as it was in the minds of heroic voyagers who were also men, it may remake our image of mankind. No longer that preposterous figure at the center, no longer that degraded and degrading victim off at the margins of reality and blind with blood, man may at last become himself.
>
> To see the earth as it truly is, small and blue and beautiful in that eternal silence where it floats, is to see ourselves as riders on the earth together, brothers on that bright loveliness in the eternal cold — brothers who know now they are truly brothers.[137]

This global communitarian image is startling, and in some ways frightening, calling for collective reassurance and action. Oppenheimer would certainly be "very, very glad" that MacLeish had "put it out" and would express his "conviction that it will help." However, Oppenheimer would temper his gratitude by reminding MacLeish that when it comes down to it, community is pluralistic not global, and in large part based on specialization.

In the next chapter, we move forward to 1962, and an exchange between the Nobel Prize-winning physicist I. I. Rabi and Oppenheimer who were close friends. Its subject matter begins with science and education in the so-called age of specialization.

Chapter 4

Rabi, Oppenheimer, and the Universal Culture of Science

Background

On a Sunday in June 1962, I. I. Rabi was the guest on the NBC television show, *The Open Mind*. Eric Goldman moderated the program, which was on "Science and American Society." First produced in 1959 and featuring prominent figures as guests, *The Open Mind* presented the American public with in-depth interviews and discussions of contemporary issues. The show ran until 1967, winning Emmy awards in 1962 and 1967.

Goldman introduced Rabi as a winner of the Nobel Prize for Physics and as someone who had "held virtually all the key posts bearing on science and national policy in this country." His guest was "one of the most active and most deeply respected of that emerging type in American life, the scientist-statesman," someone who had "acquired, among scientists and non-scientists alike, an extraordinary reputation for a warm and humane approach to human affairs and for a mellow wisdom that moves easily across specific disciplines."[138] Two decades later, in 1984, Rabi could still command a television audience when he appeared as "A Man of the Century" on *A Walk Through the 20th Century* with Bill Moyers.

The interview and discussion on *The Open Mind* showed Rabi at his best. The topics ranged from American education to the public understanding of science, from science and values to the division

between "The Two Cultures" of the sciences and humanities, and from arms control to the possibility of nuclear war. Rabi was no stranger to *The Open Mind*. In 1960, C. P. Snow, Reinhold Niebuhr,[j] and Rabi had been the guests on *The Open Mind* discussing "The Impact of Science on Western Civilization."

Rabi also was no stranger to Goldman. In fact, they were close friends. Rabi had just spent the 1961–62 academic year at Princeton University as the Schreve Fellow in History and as a Visiting Senior Fellow of the Council of Humanities. Goldman, a professor of history at Princeton, was instrumental in getting Rabi to come to Princeton. In addition to lecturing in Goldman's class on "Modern America," Rabi conducted two faculty seminars on issues of science and culture. These seminars met approximately fortnightly at Rabi's house and involved Princeton faculty members from a variety of departments.[139]

The seminars, which included a discussion on the decision to build the hydrogen bomb, focused on the so-called cultural gulf between scientists and humanists as well as possible initiatives in education to promote the public understanding of science. The seminars were successful on several levels. As Charles Gillispie, historian of science at Princeton, wrote to Rabi, "I think it [a report] speaks for itself, and you will see that it owes almost everything to the discussions at your house during the course of the year."[140] This report was submitted to the president of Princeton from the Committee on the Study of Science in Society. It recommended programmatic and curricular initiatives "concerned with the public understanding of science, of science itself, and of the public responsibilities of the scientific community."[141]

These faculty seminars also benefitted from the participation of Oppenheimer, then director of the Institute for Advanced Study at

[j]Sir Charles Percy Snow (1905–1980) was a British novelist, physicist, and government administrator who introduced the now famous "Two Cultures" (i.e., scientists vs. humanists with physical scientists at one pole and literary intellectuals at the other pole). Reinhold Niebuhr (1892–1971) was a Protestant theologian and regarded by many as the foremost public theologian of 20th-century America.

Princeton. Rabi and Oppenheimer were personal friends who had first met in 1928 in Leipzig as young American physicists who had gone to Europe to learn the new revolutionary physics of quantum mechanics.

After a biographical sketch of Rabi, this chapter turns to a January 1962 letter that Oppenheimer wrote at the request of Rabi about the subject of these seminars. This letter serves as a steppingstone into the thought of these two physicists.

Born in 1898 in the small Austro–Hungarian town of Rymanow (now in Poland), Rabi was brought to the United States by his Orthodox Jewish parents in 1899.[142] The family had limited financial means and settled in the Lower East Side of New York City; later, they moved to the borough of Brooklyn.

Rabi attended public schools in New York City. In 1916, with the assistance of scholarships, he entered Cornell University and graduated with a bachelor's degree in chemistry in 1919. Then, after a four-year hiatus, Rabi entered the physics department at Columbia University in 1923 and completed his PhD requirements in 1926. His dissertation research involved a simple and accurate method that he had developed for measuring the magnetic susceptibility of crystals.

In 1926, Rabi and Helen Newark were married. One year later, Rabi began a two-year postdoctoral sojourn in Europe interacting and studying with such physicists as Niels Bohr, Werner Heisenberg, Wolfgang Pauli, and Otto Stern. Rabi also came into contact with several young American physicists including Oppenheimer and Edward Condon, and the future American physicists Hans Bethe and Edward Teller. Rabi's most significant work was his successful and innovative experiments with molecular beams in Stern's laboratory in Hamburg.

In 1929, Rabi returned with his wife to the United States and began his career as a lecturer in physics at Columbia University. In 1968, he retired from Columbia as University Professor, the first Columbia professor to be so designated. During the 1930s, with the assistance of his co-workers and students, Rabi developed methods for measuring the magnetic properties of atomic nuclei. This work culminated in Rabi's development of the molecular-beam

magnetic-resonance method and his being awarded the 1944 Nobel Prize for Physics.

With war raging in Europe and Asia, Rabi joined the Radiation Laboratory at MIT in November 1940. Serving as head of the research division and as associate director of the laboratory, Rabi guided the development of radar systems for the war. He also was a senior adviser to Oppenheimer on the atomic bomb project and witnessed the first atomic bomb test at Alamogordo, New Mexico, in July 1945.

After the war, Rabi returned to Columbia where he rebuilt the physics department, which had been depleted during the war, hiring several future Nobel Prize winners. But with his success as a leading wartime physicist and his recent Nobel Prize, Rabi was positioned to move into the public arena — an arena shaped by the birth of the nuclear age and the Cold War. And so he did, entering public life as both government adviser and institution builder. For example, he served on the powerful General Advisory Committee (GAC) to the Atomic Energy Commission from 1947 to 1956, succeeding Oppenheimer as its chairman in 1952. Remember, Rabi and Oppenheimer along with the other members of the GAC are noted for their opposition to the crash program to develop the hydrogen bomb. Rabi also was involved in the Atoms for Peace program during the Eisenhower administration and played the key role in organizing the first International Conference on the Peaceful Uses of Atomic Energy in Geneva in 1955. As an institution builder, Rabi was instrumental in the establishment of Brookhaven National Laboratory in 1947 and CERN in 1952.

Most important, Rabi became a spokesperson for science or, in other words, he became a public intellectual speaking on behalf of science as a cultural and moral force. He continued in this capacity until his death in January 1988. Later in this chapter, Rabi's vision of the nature of science and society that he presented to the public is discussed and contrasted with Oppenheimer's — providing a richer and more meaningful understanding of the views of these two physicists — but first, let us take a detailed look at Oppenheimer's 1962 letter to Rabi concerning the faculty seminars.

Oppenheimer's Response to Rabi

Oppenheimer began his letter by saying,

> You asked me to put down a few words on the subject of the seminars that you have been holding.
>
> As you know, I came to these seminars late. I understand that their object is to devise practical steps which would help to assimilate the sciences, with their great diversity of subject, style and purpose, and with their rapid growth and growing importance, to the general culture of our times, to make them more nearly an integral part of it. More specifically, I understand the question as relating to what could be done in undergraduate instruction at Princeton, and still more specifically through the teaching of history, as in the large course on American institutions.
>
> I should, I think, never have supposed that there was very much that could be done in this context, nor that it would be very easy to do. Some of the reasons, to me compelling, for this are set forth at too great length in the accompanying text of a talk that I gave in Tokyo. The seminars that I have attended have not changed my mind.[143]

Oppenheimer then "with a very modest hope" made "a very limited proposal." The proposal aims at providing material, in particular stories (e.g., Bohr's account of his discussions with Einstein), which "could be used in undergraduate courses to make an awareness of scientific life a more natural part of elementary education." It is interesting that Oppenheimer framed his proposal in the context of the following observation.

> Our seminars have seemed to me most revealing in those moments where one or another of us was telling a story, either of the development of a scientific discovery or of a human predicament that the sciences had thrown up, or of our own troubles in understanding or communicating with one another. In order to tell stories which reveal the intellectual, the heroic, the comic, and the human aspects of the sciences, there must be sources.[144]

In this letter, Oppenheimer referred Rabi to his Tokyo talk for some of the reasons underlying his skepticism. This lecture, entitled "Science and Culture," was delivered in 1960 and is essentially identical to lectures that he delivered and published in numerous places (including Mexico City, Colorado, Brazil, Geneva, and California) from 1960 to 1965.[145] The lecture is very compact and can be taken as a synopsis of many of Oppenheimer's views on science and society.

With respect to education in this lecture, Oppenheimer set forth his views that the "traditions of science are specialized traditions" and this is what gives "the enormous thrust and power to the scientific experience." Furthermore, "the cultural values of the life of science almost all lie in the intimate view [specialization] … and not in the general encyclopedia-like description of what the progress of science is all about." However, specialization is "one of the things which also makes the great problem of teaching and explaining the sciences."

What Oppenheimer was saying here was not new. In earlier works, like his "The Tree of Knowledge" published in *Harper's Magazine* in 1958, Oppenheimer held that due to cognitive pluralism and the need for tacit understanding and cultural coherence "all of us in our years of learning … need some true apprenticeship, some hard and concentrated work, in the specialized traditions." Even in 1947, he was critical of teaching science to undergraduates using historical methods or case studies, in particular, James Conant's views on teaching science. For Oppenheimer, science teaching "is at its best when it is most like an apprenticeship"[146] since an element of action is inseparable from understanding. One must participate in science if one is to truly benefit from science.

Further, in his "Science and the Human Community" published in *Issues in University Education* and based on his 1957 talk at the Fulbright Conference on Higher Education, Oppenheimer advised that we should try to learn something like "a practitioner" and "do not just learn what it is in general terms," and then "learn something else as well that is quite different."[147] He went on to express his skepticism about the so-called "general-education approach" since this "is essentially a description … of what has gone on in broad areas of

science." Furthermore, survey courses and general accounts "serve a necessary purpose only because without them one cannot navigate."

Likewise, consider Oppenheimer's "very limited proposal" described in his letter — providing material, in particular stories, which "could be used in undergraduate courses to make an awareness of scientific life a more natural part of elementary education." Such materials and stories help by revealing "the intellectual, the heroic, the comic, and the human aspects of the sciences." This proposal brings to mind his 1953 Reith Lectures. Recall that in his third lecture, when he turned to his detailed discussion of atomic physics and complementarity, Oppenheimer prepared his audience by saying,

> We must talk of our subject not as a community of specialized scientists but as men concerned with understanding, through analogy, description, and an act of confidence and trust, what other people have done and thought and found. So men listen to accounts of soldiers returning from a campaign of unparalleled hardship and heroism, or of explorers from the high Himalayas, or of tales of deep illness, or of a mystic's communion with his God. Such stories tell little of what the teller has to tell. They are the threads which bind us in community and make us more than separate men.[148]

Remember, genuine cognitive and cultural bonding by such engagement requires epistemic second-order understanding obtained through some hard and concentrated work in a specialized tradition — that is, a true apprenticeship. Consequently, in his 1962 letter, Oppenheimer was proposing, at least in part, the development of curricula materials and initiatives for such engagements in undergraduate education along with emphasis on specialization and survey courses to help one "navigate" the intellectual landscape. Hence, Oppenheimer's critique and proposal in his letter are understandable, even predictable, given his works that predate his Tokyo lecture.

Focusing Oppenheimer's Hope and Vision

Oppenheimer's Tokyo lecture "Science and Culture" — containing topics like the rapidity of scientific change, Bohr and complementarity,

propositional versus thematic discourse, and the dual duty of specialization and openness — is essentially just a summation of many of the views and recommendations that comprise what has been characterized as Oppenheimer's hope and vision of 1957–59. To help substantiate this idea, consider the following. In May 1962, Oppenheimer received a letter from John Fischer, an editor at *Harper's Magazine*, inquiring about publishing what was essentially Oppenheimer's Tokyo lecture.[149] He wrote that his wife by "sheer chance" happened to hear a radio broadcast of Oppenheimer's "Reflections on Science and Culture" that was "originally delivered at the summer lecture series of the University of Colorado in 1961." Fischer remarked that his wife — who "thinks everything you write is wonderful" — "told me that the talk ought to make a first-rate magazine article," hence the inquiry for it to appear in *Harper's*.

Oppenheimer responded by sending a text of the talk but cautioned that there are "reasons why you may not wish to publish the paper" since "it is quite long, and probably even rather difficult."[150] However, he would welcome editing the paper and possibly an abbreviated version might be of interest to *Harper's*. On June 20, Fischer replied,

> For nearly two weeks we have been trying hard to figure out some way to edit and abbreviate the enclosed text, as you suggested in your letter of June 4. I'm unhappy to have to report that we failed. The main trouble was not the difficulty of the language, as you feared; on the contrary, you write with unusual lucidity. The real problem, which emerged as we worked on the text, is that a number of your main points have already have been made in previous articles in Harper's — notably in your own piece which we published about three years ago. Consequently, we concluded — with considerable reluctance — that an article based on this text would not sound entirely fresh to many of our readers, particularly those who have followed your own work with considerable attention.[151]

The article that Fischer refers to as "published about three years ago" is surely Oppenheimer's "The Tree of Knowledge" that appeared in the October 1958 issue of *Harper's*. Remember, "The

Tree of Knowledge" was one of the central works used in Chapter 2 when setting forth Oppenheimer's hope and vision of 1957–59.

Notice two things here concerning Oppenheimer: (1) his Tokyo lecture (a summation of much of his hope and vision 1957–59) which he recommended to Rabi was delivered several times with slight modifications from 1960 to 1965, and (2) responses like his 1962 letter to Rabi on education can be explained using works before 1960. With this in mind, a *reasonable interpretation* which is clarifying and functional is that Oppenheimer basically accepted what I have called his hope and vision of 1957–59 as the fruition of his intellectual and philosophical efforts to understand contemporary science and society — a vision providing both insights and recommendations which was reached ten years after MacLeish's "The Conquest of America."

This is not to say that Oppenheimer did not introduce and discuss new ideas after 1960. For instance, there are a few new ideas on when a scientific discovery would have a large effect on the beliefs of the culture at large. More significant, in his 1965 lecture "Physics and Man's Understanding," delivered during the Bicentennial Celebration of the Smithsonian Institution, he raised a new concern — nuclear proliferation. At the time of his lecture, there were five nuclear weapons states (America, Russia, Britain, France, and China) with the danger of other states like India and Israel joining the nuclear club. In his lecture, Oppenheimer stated that in June 1945, before the first atomic bomb, he and three other physicists (Compton, Fermi, and Lawrence) wrote in response to questions from Secretary of War Stimson concerning the end of the war and the future of world peace: "To accomplish these ends … , we recommend that before the weapons are used not only Britain, but also Russia, France and China be advised that we would welcome suggestions as to how we can cooperate in making this development [atomic energy] contribute to improved international relations." Oppenheimer continued his lecture saying that "would have been a moment to begin to worry about what is now called 'nuclear proliferation.'"[152]

Nevertheless, given our situation today (1965), he advised "I think that we will not be very successful in discouraging other powers from

this course unless we show, by our own example and conviction, that we regard nuclear armaments as a transitory, dangerous, and degrading phase of the world's history, [and] that before other nations could have competing armament, there is a good chance that armament will have become archaic."[153] He ended his Smithsonian lecture returning to ideas found in his hope and vision of 1957–59: the universality of science and its ethos, the importance of Niels Bohr and his thought, and the potential of international communities and collaboration.[k]

No single article or even lecture series can fully convey Oppenheimer's hope and vision. However, with qualifications as given above, Oppenheimer's four talks/articles dating from 1957 to 1959 (discussed in Chapter 2) — in conjunction with his 1959 talk "In the Keeping of Unreason" and his 1957 James Lectures — provide the core and nuance of his hope and vision. In particular, his 1960 Tokyo lecture even with its abundance of ideas still needs to be supplemented. For instance, in this lecture, there is less emphasis, than found in his earlier works, on knowledge being a property of specialized communities (e.g., a kind of "cognitive syndicalism") rather than individuals. Also, there is no explicit reference to the need for creating strong international communities "embarked on specialized work" to break the "grip" of the nation state though this is certainly a natural implication of the lecture.

Another feature in the development of Oppenheimer's hope and vision is the effect of the loss of his security clearance and exile from government service in 1954. First, it must be emphasized that Oppenheimer began setting forth his ideas on science and society and the significance of the atomic revolution at the end of the war in 1945, not as a result of his 1954 exile. However, certain aspects, or at least their public expression, of his later hope and vision appear to be linked

[k]In his latter works, there is a limited number of works on scientific history and biography (e.g., on Rutherford, Einstein, and Bohr) with the most extensive on Bohr. Oppenheimer began to lecture on Bohr within a year after Bohr's death in 1962. For example, Oppenheimer's Pegram Lectures given in 1963 consist of three lectures entitled "Niels Bohr and His Times." The three themes of the lectures are "all parts of Bohr's life — Physics, Philosophy, and Politics."

to his exile. During 1957 to 1959, Oppenheimer spoke of breaking the "grip" of the nation state which as sovereign and all-powerful was "a pretty deadly and impossible form for the organization of mankind." Such stark public expressions are not found in Oppenheimer's earlier works. Though he may well have believed them before 1954, clearly such public expressions would have undermined his role in shaping government policy especially with respect to national security. The loss of his security clearance and exile from government certainly provided him the freedom to speak his mind along with additional illuminations of the inner workings of the nation state.

In addition, remember Oppenheimer's 1959 rebuke of professional philosophers for removing philosophy from the public sector and his lamenting that "there have been crucial moments in which the existence of a public philosophical discourse … could have made a great difference in the moral climate and the human scope of our times." Interestingly, Oppenheimer mentioned 1945 and 1949. The 1945 reference is clearly the decision to use the atomic bomb and early attempts at international control. The 1949 reference is the hydrogen bomb controversy and the attempt of the General Advisory Committee, of which Oppenheimer was chairman, to provide certain moral dimensions to its opposition to a crash program. In fact, in the December 1953 letter to Oppenheimer from the Kenneth Nichols, General Manager of the AEC, informing Oppenheimer of the suspension of his security clearance, one of the so-called charges was that "in the autumn of 1949, and subsequently, you strongly opposed the development of the hydrogen bomb; (1) on moral grounds, (2) by claiming that it was not feasible, (3) by claiming that there were insufficient facilities and scientific personnel to carry on the development, and (4) that it was not politically desirable."[154]

Bringing morality, especially from advisers, into the inner sanctums of government and the formation of national security policy can lead to allegations of naïveté and suspicions of disloyalty. Undoubtedly, Oppenheimer's 1959 rebuke of professional philosophers is an urgent plea for moral assistance in matters of state — reflecting his 1949 opposition to the hydrogen bomb and his 1954 exile. His exile from government again provided him the freedom to speak his mind.

In the autumn of 1966 at the Institute for Advanced Study, Thomas Morgan of *Look Magazine* spent part of a day in conversation with Oppenheimer. Morgan's piece entitled "With Oppenheimer" appeared in the December 27 issue of *Look* less than two months before the physicist died at age 62. Oppenheimer — "very frail" and hair "hardly more than a white mist" — was "fighting a long illness with stoic grace."

The conversation ranged from Los Alamos and the atomic bomb to the hydrogen bomb controversy and the withdrawal of his security clearance — "probably the most wasteful exercise of the McCarthy era." Concerning science and society, the conversation ranged from "the explosion and fragmentation of knowledge" to specialized traditions and the impoverishment of the public sector as well as the "follies and dangers of nationalism." Oppenheimer also raised the concern over nuclear proliferation like he did in his Smithsonian lecture. However, there were hopeful remarks and insights along with fascinating and personal observations about responsibility as mentioned in Chapter 1. Oppenheimer mentioned the recent Limited Test Ban Treaty regarding nuclear weapons as "a tentative," but a "very precious declaration that reason might still prevail."

The conversation ended with Oppenheimer saying,

> It is a bad time … I think peace should be far more prominent in our thoughts, talk and deeds as it tended to be toward the end of the last war. … The war in Vietnam has stymied our relations, but the habit of talking to the Russians has not been lost. The attitudes of the bitterest cold-war days have not returned, despite trouble. Altogether, this teaches that peace must be approached through cooperation and non-national ways of doing things that gradually take the power and the burden from the nation-state.[155]

Throughout this conversation Oppenheimer's touched on many features of his hope and vision, and his final statement here is surely an echo from the past encompassing his 1957 call for strong international communities "embarked on specialized work" to break the "grip" of the nation state.

Rabi's Philosophical Views and Outlook

In his biography of Rabi, John Rigden devotes an entire chapter to Oppenheimer and Rabi.[156] Rigden begins by noting some of the "uncanny parallels" in their lives — both Jewish, both New Yorkers, both influential science advisers. But Rigden mainly focuses on the "deep differences" that separate the lives of these two men. Oppenheimer grew up on Riverside Drive with maids and a chauffer whereas Rabi grew up in the ghetto on the Lower East Side. Rabi embraced his Jewishness, Oppenheimer did not. Rabi won the Nobel Prize, Oppenheimer did not. For Rigden, the most profound difference that distinguishes these two men is the "sense of self" or "identity." Rabi had it, Oppenheimer did not. As will be seen, though their views on science and society have similarities, there are "deep differences," between their views as well.

Though Rabi certainly appreciated Oppenheimer's letter concerning education with its "very limited proposal" for curricular materials and initiatives, he would not have been persuaded by Oppenheimer's skepticism regarding science and education. In fact, Rabi was an educational optimist and eventually adopted what could be called "Science as the Center of Education." To understand this, we turn to Rabi's more philosophical views and outlook which will also furnish the groundwork needed for comparing and contrasting his views with Oppenheimer's.

Rabi began speaking and writing on science and society in 1950 with his talk, "Science as a Way of Life," which was published in 1951 in *The Atlantic Monthly* as "Faith in Science." He delivered this talk at an opening ceremony at Columbia University while Dwight Eisenhower was president of the university, and continued speaking on science and society until his death in 1988. Like Oppenheimer and many other intellectuals and scientists, Rabi never wrote a book whose purpose was a systematic exposition of his views. Instead, he used lectures, talks, and related publications as his primary means of presentation. Rabi's book, *Science: The Center of Culture*, published in 1970 is simply a collection of works. Though a valuable resource, it is not an exposition of his views and even omits many of Rabi's

major ideas on science and society. However, its title serves as a key to understanding his views. For Rabi, the power and universality of science place it in a unique position. Science can serve both materially and spiritually as the force to unify culture. This centering of science is held to be a radical continuance and extension of the scientific tradition founded in the 1600s and 1700s by such "whole men" as Benjamin Franklin (Rabi's ideal) and the members of the Royal Society. With this unified and universal culture of science, modern society can alleviate, and perhaps solve, its most pressing problems (e.g., poverty and war) and is provided with the vision of a scientific utopia. Rabi's mature and boldest positions were set forth in the 1960s, advocating science as the center of education and science as the replacement for religion.

Education and its importance occur as themes throughout Rabi's writings. In essence, Rabi's overall recommendation is to transform society by transforming education. The resulting society is to be unified as well as rationalistic and humanistic in its institutions, policies, and outlooks. In his early works of the 1950s, Rabi presented his views on education in terms of the quest for wisdom and the problematic separation between the sciences and humanities. His initial solution was to fuse or blend the sciences and humanities — two living traditions that would be united on roughly equal footings. However, by the middle 1960s, Rabi deemphasized the humanities and placed science at the center of education. Just as the sun dominates the solar system, so science should dominate contemporary education.

Rabi was concerned mainly with higher education in America. Though much of Rabi's analysis and criticisms of contemporary education were not unique, his proposed solution — science as the center of education — and its supporting philosophy may be unique and taken as a limiting case in the educational debates of the 1950s and 1960s.[1] In an analogous way, the Great Books Program of Robert

[1]For an excellent account of American science education during this period, see John L. Rudolph, *Scientists in the Classroom: The Cold War Reconstruction of American Science Education* (New York: Palgrave, 2002).

Hutchins and Mortimer Adler may be taken as a limiting case placed in opposition to Rabi's views on education. Beyond this, the Great Books Program is the kind of curriculum, according to Adler, "that makes Professor Rabi so very unhappy."[157] Not surprisingly, Rabi knew and interacted with both Hutchins and Adler.

Rabi's vision of science as the center of education is founded, in large part, on two educational principles. First, he advocated a *Minimalist Principle* in educational requirements and hence a contraction of general education requirements at most colleges and universities. This would allow students more freedom and encourage more student initiative in their education. Second, Rabi advocated a *Teaching-To-Our-Times Principle* whose objective "should be to develop people who can live in their age, understand the problems of their age and enjoy the great things that are happening."[158]

In order to satisfy these principles, science must be placed at the center of education, because "science has become the modern stage of human endeavor"[159] and is the force that shapes our age. Moreover, science taught in a humanistic way can fulfill many of the goals traditionally satisfied by courses in the humanities. To Rabi, humanities teach to the past and are in some ways obsolete. In addition, with science at the center, the student is presented with a progressive and enlightened endeavor connected to individual empowerment. Most important, the student is provided with an understanding of science which is vital since without it "mankind is in real danger of destroying itself."[160]

At times, Rabi moved beyond generalities and provided specifics concerning a general education program for American students that places science at the center of education and satisfies his two educational principles. In his 1967 Dean's Day talk, "What Every Young Man Should Know," at Columbia University, Rabi proposed to eliminate requirements in several areas of the humanities and social sciences (e.g., history, literature, economics).[161] He stressed five subjects for inclusion in his program: law, social anthropology in the United States, practical reasoning, English communication, and science taught in a humanistic way. For Rabi, the sciences are taught too much as skills removed from the broader aspects of life and

culture. The teaching of science must be humanized and taught more like natural philosophy — including biographies of scientists, historical and philosophical settings, and social and technological implications of science. Rabi did not specify how many semesters of such humanized science courses would be required in his general education program, but he clearly intended more than one and perhaps as many as eight. Rabi taught a course at Columbia that embraced his point of view at least twice, in 1966 and in 1967, with the title, "Cultural and Philosophical Implications of Twentieth Century Physics."

Beyond satisfying general education requirements, Rabi recommended that a student should specialize or major in a traditional discipline like business, history, or chemistry. Specialization is necessary for the development of epistemic self-confidence and humanization — a subject can be learned both "deeply and liberally" with specialization serving as a center for humanization. Though the basic sciences do not exhaust the disciplines worthy of specialization, Rabi certainly gave them a privileged position. Physics would be unique in this recommendation since, for Rabi, science is hierarchical with physics having a special role. According to Rabi, "Physics, which is the most highly developed science, is at the apex (or base) of this hierarchy and the other sciences model themselves more or less closely on the methods of physics."[162]

In sum, Rabi's overall recommendation is to transform society by transforming education with science at its center. His reasons were not based solely on pedagogical concerns, or even the historical force and epistemic success of science. For Rabi, science has a moral, even a religious, interpretation, and is capable of providing meaning both individually and collectively.

In the 1960s, at the same time that Rabi was advocating science as the center of education, he began to address issues related to science and religion. Overall, he held that science and religion are in conflict, and science (properly understood) is the necessary and legitimate replacement for religion in modern society. The conflict is "more in the nature of a civil war between two parties with the same ultimate aims of comprehension and of submission to a higher order

of knowledge and of insight."[163] For Rabi, science and religion are not complementary ways of approaching the universe and the human condition, and attempts to synthesize them result "in a devaluation of both aspects of a powerful urge of the human spirit."[164]

Though Rabi was certainly not alone here in his views, he can certainly be contrasted with other atomic scientists like Edward Condon and Arthur Compton who were theists in the Christian tradition holding that science and religion are not in conflict. For Condon, "there is no essential lack of harmony between Science and Religion" and each "without the other is incomplete and inadequate."[165] For Compton, science is an ally with religion through which God's "human creatures became His partners, sharing with Him the great task of making life what they wanted it to be" with "more and more of the responsibility" being "shifted to man's shoulders." Fittingly, for Compton, who was one of the principal scientific leaders in the Manhattan Project, "Atomic power is ours, and who can deny that it was God's will that we should have it?"[166]

Though science and religion are in conflict for Rabi, it must be realized that he was not hostile to religion. He was brought up an Orthodox Jew and throughout his life identified himself as Jewish. For Rabi, religion and science come into conflict by adopting different approaches in seeking answers to such questions as man's origin and his spiritual nature. Supported by authority and external organization, religion is "aristocratic and hierarchical" and claims "more than it knows and, therefore, must always retreat and qualify as science advances."[167] Science, whose appeal is to nature, is "democratic and leveling" and "purifies religion" as it advances.

For Rabi, even though science has undercut the traditional base of religious values, it has done so "without touching" them. For example, although Darwinian evolution and the naturalization of man removed the possibility of a supernatural justification of the sanctity of human life, this value can be maintained and grounded in a proper scientific understanding of man and his place in nature. Something like this had to be the case for Rabi. If science and reason have only skeptical and critical functions that undermine religion and morality, science would eliminate the possibility of personal guidance

and social solidarity. Not surprisingly, science has positive functions for Rabi — offering both personal and collective meaning, and even the possibility of a new faith.

> In a certain deep sense, science opens the road to a new faith, which differs from other faiths in the sense that it can be openly and humanly shared without the intervention of outside authority, a faith that comes out of man's basic nature in his relations to the greater whole of the universe.[168]

Science provides personal meaning on several dimensions. Science is a way of life in which the individual is active — a life promoting personal virtues and insights. Though science is a craft, it is much more for Rabi. Science takes the scientist out of himself not simply because its subject matter is external but also because it is a communal effort. The scientist becomes a member of an enlightened and progressive community. Moreover, this effort offers the individual the possibility of rare moments and visions filled with awe, humility, and ecstasy — the scientific discovery or epiphany.

But science offers more than personal and communal meaning to its practitioners. Rabi held that science is universal in the strong sense that it is capable of providing meaning to all members of society. With proper planning and organization, science with its practical applications can fulfill the material needs of humankind. But more important, from the Rabian perspective, the aspiration to understand is shared by all humankind, and science has been immensely successful in this epistemic quest. For example, through our scientific understanding of the universe, we are released from superstition and find that we are "at home" in the universe. The universe is not to be feared since life, and in particular human life, follows from the properties of matter. But humankind is not just "at home" in the universe — it is unique and central. In a 1964 Eternal Light radio interview sponsored by the Jewish Theological Seminary of America and broadcast on NBC, Rabi emphasized this point.

> I consider science as the great adventure of the human race. It is the thing which to my mind makes man different from other species. …

> the human being is the only one with a conscious attempt to understand the world — how it's made, how he is made, what are the basic laws. In a certain sense — through humanity, matter — the universe — becomes conscious of itself.[169]

Rabi's idea that through humanity matter "becomes conscious of itself" appears in several of his works and is characterized as a "philosophical paradox" or "philosophical enigma." One assumes that this mystery from the Rabian perspective is beyond understanding, much like the mystery of the Trinity in Christianity.

Most important, this uniqueness of humanity serves as the Rabian goal for establishing collective meaning (and a "guarantee of the sanctity of human life").

> This vision of humanity, a part of the nature of mankind, learning to understand nature, being the vehicle so to speak of nature, matter becoming conscious of itself is to me one of the greatest profundity yet. For the present I see or seek no higher goal for the human race.[170]

In sum, science is not simply the dominant force in modern society. For Rabi, science offers a universal culture not of stasis but of quest, in which the Brotherhood of Man can be achieved both materially and spiritually.

Though there are similarities between the outlooks of Oppenheimer and Rabi (e.g., science serving a model for social organization and providing cultural and personal enrichment), Oppenheimer would not agree with many of Rabi's views such as his hierarchical view of science with physics at its apex and his view that the humanities are obsolete and teach to the past. Furthermore, Oppenheimer holds that the cognitive world is richer than can be conceived by any particular person, discipline, or even culture. No single approach can be completely exhaustive. Given this along with his pluralism, Oppenheimer could not have accepted Rabi's position of science as the center of education, let alone science as the center of culture. In addition, Oppenheimer would take it as misguided to speak of science as the replacement for religion.

Rabi spoke of a universal culture based on science whereas Oppenheimer did not. For Rabi, the ideal is unified culture brought about by a common quest (i.e., scientific understanding of nature and man). For Oppenheimer, the ideal is pluralistic community connected by dialogue and conversation (i.e., "man knowing man"). Rabi emphasized unity whereas Oppenheimer emphasized coherence.

In April 1967 at the meeting of the American Physical Society, the Oppenheimer Memorial Session was held. Rabi was to speak but was prevented because of other commitments. However, he wrote the introduction to the 1969 publication of the talks given at the session. In his introduction, Rabi covered "those aspects of Oppenheimer's life that he would have discussed at the meeting." Near the end of this introduction, Rabi raised the question "why men of Oppenheimer's gifts do not discover everything worth discovering." Concerning this, Rabi remarked,

> In pondering this subject it seems to me that in some respects Oppenheimer was over-educated in those fields which lie outside the scientific tradition, such as his interest in religion, in the Hindu religion in particular, which resulted in a feeling for the mystery of the universe that surrounded him almost like a fog. … He was insufficiently confident of the power of the intellectual tools he already possessed and did not drive his thought to the very end because he felt instinctively that new ideas and new methods were necessary to go further than he and his students had already gone. Some may call it a lack of faith, but in my opinion it was more a turning away from the hard, crude methods of theoretical physics into a mystical realm of broad intuition. … In Oppenheimer the element of earthiness was feeble.[171]

Many have taken Rabi's remarks as especially insightful concerning the personality of his close friend and colleague. But they also speak of Rabi as well. As Rigden has noted there are "deep differences" that separate the lives of these two men. And it must be said that there are "deep differences" separating their thought as well.

With regard to Rabi and Oppenheimer, one might be reminded of the 1953 essay, "The Hedgehog and the Fox," written by the

British philosopher and historian of ideas Isaiah Berlin (whom both Oppenheimer and Rabi had met and interacted with). The essay begins with an interpretive discussion of a line taken from the Greek poet Archilochus — "The fox knows many things, but the hedgehog knows one big thing." Concerning this line, Berlin writes,

> But, taken figuratively, the words can be made to yield a sense in which they mark one of the deepest differences which divide writers and thinkers, and, it may be, human beings in general. For there exists a great chasm between those, on one side, who relate everything to a single central vision, one system, less or more coherent or articulate, in terms of which they understand, think and feel — a single, universal, organising principle in terms of which alone all that they are and say has significance — and, on the other side, those who pursue many ends, often unrelated and even contradictory, connected, if at all, only in some *de facto* way, for some psychological or physiological cause, related to no moral or aesthetic principle. These last lead lives, perform acts and entertain ideas that are centrifugal rather than centripetal; their thought is scattered or diffused, moving on many levels, seizing upon the essence of a variety of experiences and objects for what they are in themselves, without, consciously or unconsciously, seeking to fit them into, or exclude them from, any one unchanging, all-embracing, sometimes self-contradictory and incomplete, at times fanatical, unitary inner vision. The first kind of intellectual and artistic personality belongs to the hedgehogs, the second to the foxes … ."[172]

With cautions of over-simplification, Berlin categorizes such figures as Plato, Dante, and Hegel as hedgehogs, and such figures as Aristotle, Shakespeare, and Goethe as foxes. Again, with cautions of over-simplification, Rabi is a hedgehog and Oppenheimer is a fox.

MacLeish, Oppenheimer, and Rabi

MacLeish, Oppenheimer, and Rabi serve as examples of public intellectuals in 20th Century America while providing a micro-study in the social networking of intellectuals. They moved in the Habermasian

"public sphere" and the public spaces opened up by the Cold War and the crisis of atomic weapons. With the Cold War as an "ideological project," they demonstrate the importance not only of social and cultural capital but also of "symbolic capital" — MacLeish as Pulitzer Prize-Winning Poet, Oppenheimer as Father of the Atomic Bomb, and Rabi as Nobel Prize-Winning Physicist. Their audiences included government officials and business elites, scientists and artists, doctors and teachers, as well as the general public.

Moreover, as public intellectuals who were not outsiders but belonged to and shaped the political center, these individuals invite and challenge reflections on Antonio Gramsci's distinction between the "traditional" and "organic intellectual," Michel Foucault's 20th Century transition from the "universal intellectual" to the "specific intellectual," Edward Said's characterization of the intellectual as "outsider" and "lookout," and Pierre Bourdieu's thesis of the intellectual as "an unstable synthesis" and his call for "an International of Intellectuals."[173]

In his 1993 Reith Lectures, Said declared that "The central fact for me is … that the intellectual is an individual endowed with a faculty for representing, embodying, articulating a message, a view, an attitude, philosophy, or opinion to, as well as for, a public."[174] In the light of Jeffrey Goldfarb's thesis of intellectuals as "central democratic actors" and his caution that "Truth telling, by itself, without the framing of the modern political narratives, can be confusing" for both the individual and the deliberating public,[175] the intellectual challenge becomes the struggle to find a vision or "affirmation" that rings true and can be communicated to the public. Oppenheimer as well as MacLeish and Rabi took up this challenge by turning to the crucibles of their own lives and experiences — in the sciences, arts, academia, and government — without the aid of the philosophers and their seminars. What this says about Oppenheimer (and perhaps MacLeish and Rabi) as well as academic philosophy in 20th Century America is interesting to contemplate. Remember, Oppenheimer was a Harvard overseer, beginning his chairmanship of the Visiting Committee to the (Harvard) Philosophy Department in 1949, the year of "The Conquest of America."

MacLeish took up this challenge with a strong, even radical, individualism and his call for "the revolution of the individual." Rabi took up this challenge with a strong, even radical, unification and his call for moving science to the center of culture. Both visions are polarizing and, in many ways, limiting and closed. Oppenheimer's stance was more exploratory and cautious emphasizing both the individual and the collective with a call for coherence. His vision is not polarizing and, in many ways, ongoing and open. Most important, Oppenheimer's hope and vision was not simply an academic or intellectual exercise that concerned itself with issues like cultural coherence and education, for his vision addressed the atomic revolution itself.

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Chapter 5

International Control of Atomic Energy

Personal and historical roots of Oppenheimer's hope and vision reside in the development and military use of atomic weapons in World War II as well as postwar attempts, and their failure, to obtain international control of atomic weapons. With the revolutionary changes and crises that these weapons brought to the world at large, atomic scientists and especially Oppenheimer stepped forward to mobilize the American people and their government. For the public, they offered more than a glimpse at the secrets of the atom. By focusing on the significance of the atomic revolution for the international order, they were seen as interpreters of science and its new relationships to society, and as offering hope for transcending the atomic crisis. Of particular importance for Oppenheimer was the Acheson–Lilienthal proposal.

Acheson–Lilienthal Proposal

Oppenheimer and his fellow atomic scientists began considering and even formalizing their ideas on the political and international implications of atomic weapons before the end of the war. Of particular relevance is the influence of Niels Bohr on Oppenheimer. They first met in 1925 at Cambridge when Rutherford introduced Oppenheimer to Bohr. Bohr had won the 1922 Nobel for Physics and surely must have impressed the young Oppenheimer. During the war, Bohr was at Los Alamos for several extended visits being more "a scientific father

confessor to the younger men" than a technical advisor.[176] In 1964, Oppenheimer wrote in *The New York Review of Books*, "Bohr at Los Alamos was marvelous. … He made the enterprise seem hopeful, when many were not free of misgiving. … His own high hope that the outcome would be good, that the objectivity, the cooperation of the sciences would play a helpful part, we all wanted to believe."[177] Oppenheimer recalled that when Bohr first arrived at Los Alamos in December 1943, "his first serious question was, 'Is it really big enough?'"[178] In other words, is this atomic weapon the "great peril" that might bring about the end of war?

In his speech at Los Alamos in November 1945, Oppenheimer referred to Bohr, and this speech is an excellent place to begin an examination of Oppenheimer's early views on the international control of atomic energy. With some five hundred people packing the largest movie theater on "The Hill," Oppenheimer described the development of atomic weapons as both "a great peril" and "a great hope."[179] The peril arises not simply from the destructive power of atomic weapons, but also from such things as the quantitative advantage they give to "aggression compared to defense." The hope arises from the beneficial uses that atomic energy promises humankind (e.g., atomic power generation, medical diagnosis and treatment) in conjunction with the fact that the "common [universal] problem" of atomic weapons requires "a complete sense of community responsibility" for its solution. In particular, Oppenheimer spoke of atomic energy as

> a new field, in which just the novelty and the special characteristics of the technical operations should enable one to establish a community of interest which might almost be regarded as a pilot plant for a new type of international collaboration. I speak of it as a pilot plant because it is quite clear that the control of atomic weapons cannot be in itself the unique end of such operation. The only unique end can be a world that is united, and a world in which war will not occur.[180]

Therefore, "if one solves the problems presented by the atomic bomb, one will have made a pilot plant for solution of the problem of ending war."[181]

Oppenheimer took his views to the broader public with articles in such publications as *The Saturday Review*, *The New York Times Magazine*, and the *Bulletin of Atomic Scientists* as well as lectures at such forums as the American Philosophical Society. However, Oppenheimer's views on the international control of atomic energy reached well beyond lectures and articles, and even testimony before Congressional committees. In January 1946, he was appointed to the five-member Board of Consultants to the special committee that was charged with drawing up a concrete proposal for the international control of atomic weapons.[182] This proposal would serve as the foundation for the US proposal to the United Nations. President Truman had appointed the committee with Under Secretary of State Dean Acheson as its chair; David Lilienthal chaired the Board of Consultants. Although the result was made public on March 28, 1946, as the Acheson–Lilienthal Report, it was in large part Oppenheimer's report. As Acheson later wrote in his memoirs, "All the participants, I think, agree that the most stimulating and creative mind among us was Robert Oppenheimer's."[183]

The heart of the report was the recommendation to establish an international atomic development authority under the control of the United Nations. Atomic weapons would be prohibited from national arsenals, and all "dangerous activities" would be conducted by the Atomic Development Authority. For example, all uranium mines and atomic reactors capable of providing fissionable materials for making atomic bombs would be owned and operated by the Authority. In addition, the Authority would conduct research on the peaceful applications of atomic energy and make the results publicly available. Hence, the Authority undercut the "great peril" and promoted the "great hope" of atomic energy.

The authors of the Acheson–Lilienthal Report proposed "that in the field of atomic energy there be set up a world government" with "renunciation of national sovereignty" in the field of atomic energy,[184] and said that they were "sustained by the hope" that this "may contain seeds which will in time grow into that cooperation between nations which may bring an end to all war." They concluded their report saying "in the long term there can be no international

control and no international cooperation which does not presuppose an international community of knowledge."[185] As many believed, science with its international fraternity of scientists served as a worthy prototype for such "an international community of knowledge."

On March 30, just two days after the Acheson–Lilienthal Report was made public, Oppenheimer wrote the following in a letter to Bohr.

> Even in our gloomy moments we did not succeed quite in thinking how difficult it would get to be. This report that I am sending you is months later than it should be, and is not all it should be; but I think it may still be of interest to you. For what is good in it, it should be dedicated to you.[186]

On April 17, Bohr wrote Oppenheimer concerning the Acheson–Lilienthal report.

> I have just received a copy of the report on international control of atomic energy published by the State Department, and it is very much on my mind to give expression to you for the deep pleasure it was to me to read this report. In every word of it I find just the spirit which I think offers the best hopes for the development in which we all put our whole faith. I was also deeply impressed by the amount of thought and work which lies behind the preparation of the report, and from page to page I recognized your broad views and refined power of expression.[187]

However, by early 1947 Oppenheimer, like many others, had lost hope in the international control of atomic energy for the foreseeable future. The UN negotiations certainly had critics on both the political right and left. On the right, "The Hearst press labeled the proposal an 'imbecilic,' 'New Deal' scheme to give away the national advantage. … '… a scheme for surrendering to FOREIGN MASTERS the AMERICAN SECRET of the atomic bomb.'"[188] On the left, Secretary of Commerce Henry Wallace criticized the plan for its step-by-step procedure that was requiring the Soviet Union to show "her

cards" (e.g., its uranium deposits) while the United States retained the option of whether "to continue to play the game."[189]

But the real reason for Oppenheimer's pessimism was that negotiations at the United Nations were stalled and probably deadlocked. The Cold War between the United States and the Soviet Union was beginning on several fronts. Winston Churchill delivered his provocative Iron Curtain speech in 1946 while visiting Fulton, Missouri. In March 1947, Truman in a momentous speech before a joint session of Congress called for US aid for Greece against a communist-led insurgency as well as aid for Turkey. This speech launched what would be called the "Truman Doctrine" for containing the Soviet Union and stopping the spread of communism. The following year, the Soviet Union sponsored a coup that brought down the democratic government of Czechoslovakia and would later blockade Berlin.

In March 1947, Oppenheimer was requested to come to Washington to assist the United States delegation at the UN in drafting a speech for the UN ambassador related to the negotiations on the control of atomic energy. In the course of this visit, Oppenheimer spent a considerable amount of time with Fredrick Osborn, the newly-appointed US delegate to the United Nations Atomic Energy Commission. During this time, Oppenheimer "displayed the intensity of his belief that continued negotiations in the UN were not only futile but potentially dangerous."[190] Also, when Oppenheimer first arrived, he had stopped by the State Department and Acheson had shown him a draft of Truman's upcoming speech. Acheson wanted him to know that "we were entering an adversary relationship with the Soviet [Union], and whatever we did in the atomic talk [at the UN] we should bear that in mind."[191]

In the January 1948 issue of *Foreign Affairs*, Oppenheimer published an article entitled "International Control of Atomic Energy."[192] With success of the UN negotiations in the short term "rather unlikely," Oppenheimer addressed the questions of "why in a matter so overwhelmingly important to our interest we have not been successful" and "what lessons this has for our future conduct." This article, in conjunction with two talks he gave during this time, help bring to light Oppenheimer's thinking at this time as well as connections between the Acheson–Lilienthal initiative and his later hope and

vision. One talk entitled "Atomic Energy as a Contemporary Problem" was a restricted talk given in September 1947 at the National War College in Washington, DC. This talk was later published in 1955 in Oppenheimer's book *The Open Mind*. The other talk entitled "Some Aspects of the Problem of Atomic Energy" was delivered in January 1948 at the annual meeting of the New York State Bar Association.

In these works, Oppenheimer touched on the hopeful aspects of atomic energy — the need for an international response to the crisis of atomic weapons, the hope for large-scale atomic power generation, and the "freedom of maneuver" which the novelty of atomic energy provided. Certainly, there were sacrifices and renunciations that the international control of atomic energy demanded from the United States and Western Europe. But most important, Oppenheimer stated that

> the sacrifices, the renunciation, required of Russia are of another order of magnitude. That is because the proposed pattern of control [openness and cooperation] stands in a very gross conflict to the present patterns of state power in Russia. The ideological underpinning of that power, namely the belief in the inevitability of conflict between Russia and the capitalist world, would be repudiated by a co-operation as intense or as intimate as is required by our proposals for the control of atomic energy.[193]

Though non-cooperation of the Soviet Union was certainly "a most essential part of a true answer" for the lack of success, there was, according to Oppenheimer, much more to be said and lessons to be learned. There were problems inherent in atomic energy itself like its most beneficial aspect (atomic power generation) being long-term but its threat being immediate. There were mistakes on the part of the United States. By developing atomic weapons in secret during the war, we "cast a doubt upon our willingness to cooperate in the future with allies [e.g., Soviet Union] with whom we had not in this field been willing to cooperate during the war." By going to the United Nations, "where matters of the highest policy could only be touched upon with difficulty and clumsily," instead of working directly with

heads of state appears "to have prejudiced the chances of any genuine meeting of minds." Further, for Oppenheimer, there had been a "schizophrenic separation of our dealings in this field [atomic energy] from our dealings in all others."[194]

In the end, Oppenheimer held that the thinking and policy of the Soviet Union in conjunction with the actual course of events necessarily gave "little support to the view that by prompter, clearer and more magnanimous action we might have achieved our purposes." He did caution his audience that had there been a greater reality for the internationalization of atomic energy, "we ourselves … would have found many difficulties in reconciling particular national security, custom and advantage with an over-all international plan for insuring the security of the world's peoples."[195]

So what was to be done? In his talk at the National War College in September 1947, Oppenheimer reiterated that he was confident that "the arguments that were given in the Acheson–Lilienthal report are correct arguments" and that "Some day we will want to come back to this."[196] In his January 1948 talk, Oppenheimer told the New York State Bar Association that such arguments "are in some ways eternal arguments. They will be as strong five years from now as they were two years ago. They will be strong twenty years from now." In other words, Oppenheimer's narrative involving the international control of atomic energy had become a long-term narrative. What was imperative was that in the pursuit of its short-term goals, the United States did not "do anything that would shut the door [on the future prospect for the international control of atomic energy]."[197]

Though "a profound change in the whole orientation of Soviet policy" was absolutely necessary, there must also be, according to Oppenheimer, "a corresponding reorientation of our own."[198] There must be balance between short-term security and long-term security. We must remember that proposals like the internationalization of atomic energy "presuppose a very large measure of peaceful intention, of co-operation, of confidence and candor before they can get started." In particular, in atomic policy we must include "the achievement of international control as one of the things to keep in mind" — even when rearming.[199]

In December 1948, Oppenheimer delivered another talk where he addressed the issues surrounding atomic energy. This talk entitled "The Open Mind" was delivered "before a joint session of the Rochester Association for the United Nations and the Rochester Foreign Policy Association," and later published in his 1955 book by the same title.[200] With an audience of some thirty-five hundred in attendance, as well as a radio audience, Oppenheimer spoke of the need for "style."[201] Illustrating this with an historical example of Lincoln during the Civil War, Oppenheimer said "it is style which makes it possible to act effectively, but not absolutely." In the case of foreign policy, style "enables us to find a harmony between the pursuit of ends essential to us, and the regard for the views, the sensibilities, the aspirations of those to whom the problem may appear in another light."[202] What Oppenheimer was saying here, for example, is that in pursuing our short-term goals, we must try to demonstrate, or at least hint at, our long-term objectives, especially to our enemies. A salient example of lacking style is the Bikini atomic tests (which Oppenheimer opposed and did not attend[203]) by the United States in the summer of 1946 while it was negotiating for the international control of atomic energy.

In this talk as in his article in *Foreign Affairs*, Oppenheimer used the metaphor of planting seed in new soil "and then waiting for it to grow, and then harvesting it." Likewise, we need to enlist "time and nature in the conduct of our international affairs: in the quest for peace and a freer world. This is not meant mystically, for the nature which we must enlist is that of man; and if there is hope in it, that lies not least in man's reason."[204] The UN negotiations on atomic energy would officially continue, really linger on, until September of 1949.[205] The Soviet Union conducted its first atomic test and ended the American atomic monopoly that August, the month that MacLeish's "The Conquest of America" appeared.

It is perhaps today too easy to speak of the Acheson–Lilienthal initiative as utopian. Even Oppenheimer said that the internationalization of atomic energy "would have altered the face of the world."[206] But in many ways it was not unrealistic and reflected its time. With the victory of the Allies over the Fascists, the world would be remade

and this might be an ideal time to break the "grip" of nationalism. Early postwar, international efforts like the formation of the United Nations as well as the World Bank and the International Monetary Fund succeeded. Further, atomic energy offered "freedom of maneuver" since it "lay in a field international by tradition and untouched by preexisting national patterns of control" and its novelty guaranteed no entrenched economic interests.[207] Plus, atomic scientists were strategically placed due to the crucial roles they played in the development of atomic weapons and their roles as government advisers. Atomic scientists, committed to scientific internationalism, knew the facts and had "symbolic capital" with their governments and the public. And there was always the "great peril" and the "great hope" of atomic energy which many believed required an international solution.

Further, there were even hopeful signs and progress at the United Nations. In December 1945, the Soviet Union accepted an American proposal and joined the United States along with other countries like the United Kingdom in proposing that the UN establish the United Nations Atomic Energy Commission (UNAEC). The UNAEC was officially put in place in January 1946 and would take up the international control of atomic energy.[208] In September and October of 1946, there was even some limited optimism. The Scientific and Technical Committee had unanimously reported — with regard to a diluted version of the Acheson–Lilienthal report — that it did not find "any basis in the available scientific facts for supposing that effective control is not technologically feasible."[209] But even this limited optimism quickly vanished. At the end of October in front of the United Nations General Assembly, Soviet Foreign Minister Vyacheslav Molotov, charged that the American plan "proceeds from the desire to secure for the United States … the monopolistic possession of the atomic bomb" and demanded that it eliminate its atomic weapons as part of "a general reduction of all armaments."[210]

There are correspondences and connections between this early initiative for the internationalization of atomic energy and Oppenheimer's later overall hope and vision. Both have themes of crisis that can only be solved internationally, and both seek to break the "grip" of

nationalism. There are communitarian themes with science and its ideal communities as well as the appeal to scientific internationalism. There are crucial roles for the specialized work of international communities working for the benefit of the people of the world. In the concluding paragraph of his 1957 Fulbright talk "Science and the Human Community" where Oppenheimer spoke of his hope and vision, he even referred to Bohr and the post-war international efforts of the United States (e.g., the Acheson–Lilienthal initiative).

> That is, indeed, what so many physicists throughout the world have been shouting for the last twelve years or so. It has usually been a rather muted shout, as in the case of Niels Bohr, but it has been a very deep and heartfelt shout. This hope is what animated some of the first efforts in the United States after the war to suggest ways of coping with the new problems of atomic energy.[211]

Oppenheimer said that the internationalization of atomic energy "would have altered the face of the world." That was certainly true in 1946 but not necessarily true of the future. The postwar failure of the international control of atomic energy demonstrated the need for a long-term view, and perhaps a broader and more detailed view. Many of Oppenheimer's later works like his Reith Lectures (1953) and James Lectures (1957) can be interpreted, in part, as providing the foundation for such a view. He focused on and developed such ideas as the need for specialization, that knowledge is more a property of the community not the individual, the necessity of our dual duty (specialization and openness), and a viable public sphere with philosophy taking its proper place. With this robust foundation in conjunction with communities embarked on specialized work (essentially his hope and vision of 1957–59), we might break the "grip" of nationalism and move forward to cultural coherence and a world without war and, in particular, a world free of nuclear weapons.

Though the Acheson–Lilienthal initiative failed, it remained symbolic in several ways. Oppenheimer held that it "should not be too lightly dismissed as a remarkable achievement in the democratic formulation of public policy." The United States had "developed, and in

large part committed itself to, a policy of genuine internationalization of atomic energy, … fortified this policy with concrete, if sketchy, proposals as to how the internationalization was to be accomplished," and placed them before the governments of the world. Throughout the negotiations, "the basic idea of security through international cooperative development [had] proven its extraordinary and profound vitality."[212] Further, on a personal front, the Acheson–Lilienthal report illustrated the potential of how insiders — especially scientific advisers — in the national government could move the United States towards internationalism and away from extreme nationalistic reactions. For Oppenheimer, it might also have confirmed a proper role of experts, namely, to define and illuminate possibilities for public officials as well as the general public, and thereby contribute to a culture of critical discourse and deliberation.

As noted earlier, Oppenheimer published an article entitled "International Control of Atomic Energy" in the January 1948 issue of *Foreign Affairs*. With success at the UN in the short term "rather unlikely," Oppenheimer concluded his article by writing,

> It is necessarily denied to us in these days to see at what time, to what immediate ends, in what context, and in what manner of world, we may return again to the great issues touched on by the international control of atomic energy. Yet even in the history of recent failure, we may recognize elements that bear more generally on the health of our civilization. We may discern the essential harmony, in a world where science has extended and deepened our understanding of the common sources of power for evil and power for good, of restraining the one and of fostering the other. This is seed we take with us, traveling to a land we cannot see, to plant in new soil.[213]

Surely, part of this seed is the Acheson–Lilienthal proposal. But even given that its ideas and arguments were "correct" and "in some ways eternal," the proposal failed at the United Nations. This failure not only had international ramifications but had moral ramifications as well.

Moral Ramifications

Though the Acheson–Lilienthal proposal can be viewed as a noble, and perhaps not unrealistic, attempt by the United States to eliminate atomic weapons and promote the benefits of atomic energy, it was certainly not viewed that way by the Soviet Union. On June 14, 1946 at the United Nations, Barnard Baruch had formally announced the American plan for the international control of atomic energy. But less than three weeks later, on July 1 at Bikini in the Pacific, the United States conducted its first atomic test since the end of the war. With the United States negotiating and testing, the Russians quickly responded. "*Pravda* charged that the United States aimed not at restricting but at perfecting the atomic weapon" and was engaged in atomic blackmail.[214] The Acheson–Lilienthal initiative was a masquerade that really aimed at maintaining the American atomic monopoly.

The Soviets were not alone in placing the Americans in a troublesome moral light. In 1948, the British physicist P. M. S. Blackett, who won the Nobel Prize for Physics that same year, published his book *Fear, War, and the Bomb*. He claimed that given the evidence, "the dropping of the atomic bombs [on Japan] was not so much the last military act of the second World War, as the first major operation of the cold diplomatic war with Russia now in progress."[215] He argued that this interpretation made sense of the facts. For instance, the atomic bombs were rushed into use with the first one being dropped on Hiroshima on August 6 just two days before the deadline for the Soviet Union to enter the war against Japan. Blackett's reasoning coincided well with the interpretation that the United States was conducting atomic diplomacy and the Acheson–Lilienthal initiative was really a masquerade.

Blackett's claim stood in sharp contrast to the American interpretation of the use of the atomic bomb. The official view was that the atomic bombs were used to end the war as quickly as possible and save lives, and in particular to avoid an invasion of the Japanese mainland. In December 1946, Karl Compton published an article entitled "If the Atomic Bomb Had Not Been Used" in *The Atlantic Monthly*. Compton, who was trained as a physicist, was president of the Massachusetts Institute of Technology and served on several wartime

projects. In particular, he was member of the Interim Committee which was formed in May 1945 by Secretary of War Henry Stimson. This committee made recommendations concerning postwar organization as well as the military use of the atomic bombs against Japan. In his article, Compton wrote that he believed "with complete conviction, that the use of the atomic bomb saved hundreds of thousands — perhaps several millions — of lives, both American and Japanese; that without its use the war would have continued for many month."[216]

Two months later in February 1947, the former Secretary of War Henry Stimson published his influential article entitled "The Decision to Use the Atomic Bomb" in *Harper's Magazine*. Stimson wrote that the decision to use the atomic bomb was a considered, deliberate decision made within a broad framework, and he was informed that "operations [in the invasion of Japan] might be expected to cost over a million casualties, to American forces alone. … [and it was expected that] enemy casualties would be much larger than our own."[217] He emphasized that "the atomic bomb was more than a weapon of terrible destruction; it was a psychological weapon."[218] It had shocked the Japanese government; and all the evidence seen by him indicated that "the controlling factor in the final Japanese decision to accept our terms of surrender terms was the atomic bomb."[219] In essence, the official American justification for the atomic attacks was utilitarian — they were the lesser of two evils. By way of contrast, Blackett's interpretation held that the reasoning behind the attacks was not primarily a moral utilitarian calculation, but simply power politics between the United States and the Soviet Union writ large.

By focusing on Oppenheimer, there arise other elements in the moral debates surrounding the atomic attacks. Oppenheimer was significantly involved in the discussions and decision on how the atomic bombs would be used. As a member of the Scientific Panel to the Interim Committee, Oppenheimer attended its May 31, 1945, meeting where the committee recommended the combat use of the atomic bomb. At this meeting, Oppenheimer stated that "it might be wise for the United States to offer to the world free interchange of information with particular emphasis on the development of peace-time uses

[of atomic energy]. The basic goal of all endeavors in the field should be the enlargement of human welfare. If we were to offer to exchange information before the bomb was actually used, our moral position would be greatly strengthened."[220] Concerning the Russians, Oppenheimer "suggested that we might open up this subject [controls and collaboration concerning atomic energy] with them in a tentative fashion and in the most general terms without giving them any details of our productive effort." And "we might say that a great national effort had been put into this project and express a hope for cooperation with them in this field." According to the minutes of the meeting, Oppenheimer "felt strongly that we should not prejudge the Russian attitude in this matter."[221]

In addition, concerning whether the United States should conduct a technical demonstration of the atomic bomb to induce the Japanese to surrender, the Scientific Panel — consisting of Arthur Compton, Ernest Lawrence, Enrico Fermi, and Oppenheimer as its chairman — concluded in its June 16 report to the Interim Committee that they could "propose no technical demonstration likely to bring an end to the war" and they saw "no acceptable alternative to direct military use." However, they recommended that "before the weapons are used not only Britain, but also Russia, France, and China be advised that we have made considerable progress in our work on atomic weapons, that these may be ready to use during the present war, and that we would welcome suggestions as to how we can cooperate in making this development contribute to improved international relations."[222]

On August 17, three days after the Japanese accepted the surrender terms of the Allies, Oppenheimer wrote on behalf of the Scientific Panel to Henry Stimson. The letter urgently recommended that "all steps be taken, all necessary international arrangements be made" to "making future wars impossible." In support of this recommendation, the panel had noted that future atomic weapons would be "quantitatively and qualitatively far more effective than now available," that the panel was "unable to devise or propose effective military countermeasures for atomic weapons," and even if the United States could maintain a "hegemony in the field of atomic weapons" this could not protect it "from the most terrible destruction."[223]

Nevertheless, at Los Alamos during the war, Oppenheimer had intervened to stifle moral and political opposition by some of the scientists to the rapid development and military use of the atomic bomb. He must have thought that such concerns might needlessly complicate things and divert the lab from its goal — a weapon for combat use. For example, Oppenheimer blocked the circulation at Los Alamos of a petition from the physicist Leo Szilard that was opposed "on moral grounds to the use of these [atomic] bombs in the present phase of the war."[224] In addition, when Robert Wilson, a young physicist with a Quaker heritage, called a meeting at Los Alamos to discuss "The Impact of the Gadget [Atomic Bomb] on Civilization," Oppenheimer warned him not to do it. Wilson persisted, so Oppenheimer then attended the meeting and "skillfully channeled the internationalist idealism of this group of young scientists into the task of building the bomb and used the meeting to reinforce their dedication to the work."[225] Beyond his charisma and his authority as scientific director of Los Alamos, Charles Thorpe stresses that "The primary argument that Oppenheimer had in his arsenal, one to trump all opposition, was that only combat use of the weapon would demonstrate to the world its destructiveness, and that this destructiveness itself might mean the end of all war."[226]

In all likelihood, this "primary argument" played a significant role in Oppenheimer's thought at this time. David Hawkins, who was a friend of Oppenheimer as well as a special administrative assistant to Oppenheimer during the war, essentially confirms this along with an insightful analysis. In a 1996 interview conducted by Mary Palevsky, Hawkins said,

> He [Oppenheimer] was obsessed with an understanding that this development [of the bomb] was in his view inevitable and that it was a change, to use his phrase, "a change in the nature of the world." Typically he saw that, and probably at the same time believed, and often correctly, that other people wouldn't see it. …
>
> And he wanted to act in such a way that the world would understand this as deeply and as soon as possible. That, I think you could say, is a rationalization with which he cloaked the Faustian bargain. But I think it was quite genuine. I'm pretty sure from conversations with him that Oppenheimer really had the belief

> which would be, from an unfriendly critic, a rationalization of his position: that the bomb had to be used, because if it were not used in World War II it would be used in World War III. The world had to know about it and its full destructive character and not simply as a demonstration of an explosion, but as a weapon. Well, obviously that could be, and in some measures certainly was, a rationalization of his position. But it has to be examined as an argument in its own right.
>
> And I was well persuaded of it at the time, but in retrospect I suspect that the passage of events is much too complicated to make that kind of argument stick. Again, it's the lesser evil argument. The first lesser evil argument was the one about beating Germany to the production. The second one was, if we don't do this now something even worse will happen. But I think he was firmly convinced of that.
>
> And remember that the Faustian compact, at least in Goethe's version, brought destruction but also the possibility of a new era: a fifty-year war that remained "cold," a nuclear pacifism creeping into high places.[227]

What's more, in October 1945, Oppenheimer endorsed this argument before a subcommittee of the Senate Committee on Military Affairs. In response to questions and remarks by Senator William Fulbright, Oppenheimer testified,

> May I be very honest. Most scientists, because they are scientists were certainly not happy with the absolute national sovereignty which prevailed 10 years ago. They were not happy with the war.
>
> When we had the possibility of making atomic weapons, certainly for many of us a great argument was that it might be necessary or helpful in shortening the war; but there were many times when we thought we would never get it done in time for that; many times when we thought that the war was so completely won without it that we might as well stop. None of us did want to stop, and the reason was that we thought that since atomic weapons could be realized, they must be realized for the world to see because they were the best argument that science could make … for a more reasonable and a new idea of the relations between nations.[228]

Senator Fulbright responded,

> In other words, that is one of the justifications for its use. It took the shock, we will say, of Hiroshima to bring the world to a consciousness of what another war might mean, and it therefore gives the reason for seeing that there is no more war. I think in that sense it does justify its use, regardless of how regrettable it may have been in that particular instance.[229]

Oppenheimer responded in return, "That is in my opinion" and then added "I know that my colleagues share these views."[230] Using the words of Thorpe, Oppenheimer's "primary argument" — which trumped all opposition — placed "the atomic bomb into a narrative of progress, the weapon's global destructiveness providing a vehicle for the achievement of universal human ideals." The bomb became "a medium for transcendence, a realization of modernist dreams of breaching the constraints of history and tradition."[231]

Oppenheimer apparently was attracted to similar reasoning even after the use of the atomic bomb. In his 1954 security hearing when the subject was the hydrogen bomb controversy, Oppenheimer stated that it was his judgment that "when you see something that is technically sweet, you go ahead and do it and you argue about what to do about it only after you have had your technical success." He then remarked this is "the way it was with the atomic bomb."[232] This corresponds to his above testimony that "since atomic weapons could be realized, they must be realized" to help move the world forward to a more reasonable international order. Since the technical feasibility of the H-bomb was highly uncertain in 1949, Oppenheimer's imperative of "technical sweetness" did not apply to the H-bomb at this time. Hence, this imperative is compatible with the GAC invoking moral concerns in its opposition to a crash program; in particular, with the recommendation of the majority report: "In determining not to proceed to develop the super bomb, we see a unique opportunity of providing by example some limitations on the totality of war and thus of eliminating the fear and arousing the hope of mankind."[233]

However, once the technical sweetness of a thermonuclear device was established (say in 1951), moral concerns over a crash program would recede but could reappear in a new guise due to an altered technological environment. In 1952, this actually occurred when the State Department Panel of Consultants on Disarmament was chaired by Oppenheimer.[234] The panel recommended a moratorium on testing the H-bomb. This would provide an opportunity to approach the Soviets so that the world would not cross the thermonuclear threshold to a bomb a thousand times more powerful than the Hiroshima bomb. This was technologically and geopolitically reasonable since any thermonuclear device would have to be tested to be a reliable military weapon and any such test could easily be detected. Unfortunately, the panel's recommendation was rejected by Truman and the test was conducted in the Pacific on November 1 just three days before the presidential election. An election, the Republicans were expected to and did win, and hence denying the new administration "a unique opportunity of providing by example some limitations on the totality of war and thus of eliminating the fear and arousing the hope of mankind."

Near the end of his testimony on the second day of his 1954 security hearing, Oppenheimer made a most revealing statement.

> I don't want to conceal from you, and I said it in public speeches so it would not make much sense to conceal from you the dual nature of the hopes which we entertained about the development of bigger and bigger weapons, first the atomic bomb, and then its amplified version, and then these new things [H-bombs].
>
> On the one hand, as we said at the time, and I now firmly believe, this stuff is going to put an end to major total wars. I don't know whether it will do so in our lifetime. On the other hand, the notion that this will have to come about by the employment of these weapons on a massive scale against civilizations and cities has always bothered me. I suppose that bother is part of the freight I took into the General Advisory Committee, and into the meetings that discussed the hydrogen bomb.[235]

So in 1954, Oppenheimer still foresees nuclear weapons as moving us towards a world without war. The problem of course is how we

get there. Clearly, nuclear weapons with their frightening technological momentum must be brought into the moral realm but there is an intrinsic tension given the current geopolitical configuration of nation states. His later hope and vision offers means which are not totally insignificant for moving us forward — bring philosophy and its moral discourse back into the public sector and use international specialized communities to break the "grip" of the nation state.

Let us return to use of the atomic bomb in 1945. Oppenheimer's "primary argument" was not unique to him. In December 1945, James Conant, president of Harvard University and member of the Interim Committee, presented this argument in a letter as part of his reply to Reverend Bradford Young of Manchester, New Hampshire. Young had attended a presentation by Conant on the atomic bombings of Hiroshima and Nagasaki. With pictures showing the destruction of these two cities, Young was shocked and sent Conant a letter saying that he "felt that all of us there were war criminals." Near the end of his letter, Young said "If you have a conscience about that crime, you concealed it wonderfully well."[236]

In response to what Conant took as "a very emotional letter" that denounced him for his part in the atomic bomb program, Conant ended his letter to Young saying,

> I was in favor of using the atomic bomb as it was used … for two reasons: first, because it was a valuable supplement to the strategic bombing then in progress and which I hoped would end the war without an invasion; and second, because I felt certain that unless this bomb was demonstrated in combat there was very little chance of arousing public opinion to a point where they would take sufficiently drastic action to control it in the future. Nothing has happened since August 6 to change my views.[237]

Young wrote back to Conant a few days later thanking him for his patient letter to his own "somewhat excited letter." He ended his short letter to Conant saying,

> The decision to destroy two cities as the best way to arouse public opinion to control the A-bomb in the future must be based on so many uncertainties that only God could make it. What bothered me

> was to see you preparing and participating in such a Godlike decision with apparently no sense of presumption, no fear and trembling, no feeling of tragic involvement in a horrible deed.[238]

Much the same might be said of other government officials and atomic scientists including Oppenheimer.[m]

Given this "primary argument" and the resulting "Godlike decision," the moral significance of the Acheson–Lilienthal initiative is painfully transparent. If the initiative succeeded, the argument and the resulting "Godlike decision" might be vindicated. If the initiative failed, the argument and the resulting "Godlike decision" are in large measure condemned. What is one to make of Oppenheimer and Conant invoking this "primary argument?" A host of responses are summoned — from high stakes morality in a minefield of ethical dilemmas, to moral blindness induced by technological enthusiasm, and to moral rationalization of an inevitable evil in which one has played a central role.

Though often portrayed as suffering from profound guilt about his involvement with the atomic bomb, Oppenheimer never publicly professed regret, in fact, just the opposite. In August 1965, the twentieth anniversary of Hiroshima, in *The New York Times Magazine*, Oppenheimer said "I never regretted, and do not regret now, having done my part of the job."[239]

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[m]In a 1996 interview by Mary Palevsky, the Nobel Prize-winning physicist Hans Bethe, who was director of the Theoretical Division at Los Alamos during WWII, presents a version of the "primary argument" given by Oppenheimer and Conant. Here Bethe says that even though the use of atomic bombs in WWII saved a lot of lives, they can no longer be used for saving lives due to the great destruction that would result from nuclear war, for example, between the United States and Russia. For Bethe, this realization that the use of nuclear weapons "cannot and must not be repeated was very much facilitated by Hiroshima. If we hadn't had these two atomic bombings, people would not have realized what a terrible thing this is." Bethe continues, "And so, in a way, the victims of Hiroshima died so that other people could live. It is unhappy, but that is the way it is. And there was no way of preventing the atomic bomb from being invented, both by the United States and by Russia." (Quoted in Mary Palevsky, *Atomic Fragments* (ref. 227), pp. 70–71).

However, moral ramifications of this "primary argument" in conjunction with the failure of the Acheson–Lilienthal initiative are reflected in Oppenheimer's works and his later hope and vision. Remember that in his 1957 talk "In the Keeping of Unreason" at the Basel seminar, Oppenheimer dismissed Bertrand Russell for not engaging the "deep ethical dilemmas" and lamented, with references to 1945 (decision to use atomic bomb and early attempts at international control) and 1949 (hydrogen bomb controversy), that "there have been crucial moments in which the existence of a public philosophical discourse … could have made a great difference in the moral climate and the human scope of our times." His 1947 lecture "Physics in the Contemporary World," delivered at the Massachusetts Institute of Technology, is perhaps best known for the remark that with respect to the atomic bomb "the physicists have known sin." In August 1965, in a CBS television interview, Oppenheimer elaborated upon this remark and pointed to the shadow cast by the "primary argument."

> Long ago I said once that in a crude sense which no vulgarity and no humor could quite erase, the physicist had known sin, and I didn't mean by that the deaths that were caused as a result of our work. I meant that we had known the sin of pride. We had turned to [affect] … the course of man's history. We had the pride of thinking we knew what was good for man, and I do think it had left a mark on many of those who were responsibly engaged.[240]

Finally, in 1964 in *The New York Review of Books*, Oppenheimer recalled that when Bohr arrived at Los Alamos in 1943, "his first serious question was 'Is it really big enough?'" Taking the combat use of the atomic bomb as a realistic possibility, this question brings to life the haunting possibility of a "Godlike decision" based solely on utilitarian, historic argumentation.

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Chapter 6

Complementarity in Atomic Physics

Oppenheimer and Complementarity

In 1955 in honor of Niels Bohr at the celebration of his 70th birthday, Oppenheimer wrote a paragraph speaking of Bohr's scientific discoveries, his "philosophical courage," and his "heroic part in furthering international cooperation in science, and in defining and upholding the ideal of an open world."[241] Bohr was the most formative influence on Oppenheimer's thought. For example, Oppenheimer's persistent recommendation for the United States to approach the Allies, especially Russia, before the atomic attacks was in all likelihood due to Bohr. During 1944, Bohr had met separately with Roosevelt and Churchill concerning the atomic bomb and the postwar world, and the possibility of a terrifying arms race. In these meetings, Bohr advised approaching the Russians.[242]

Bohr's effect on Oppenheimer involved more than political and intellectual influences. For example, David Hawkins, who was friend and an administrative assistant to Oppenheimer during the war, observed Bohr and Oppenheimer together on several occasions at Los Alamos. Hawkins had received his PhD in philosophy at Berkeley in 1940 and knew Oppenheimer before the war. In 1947, Hawkins published *Manhattan District History — Project Y, The Los Alamos Project*, the official technical history of the project. According to Hawkins, "Oppenheimer not only admired Bohr, but revered him as well, and Bohr could have been the only person whom Oppenheimer felt so strongly."[243] Such strong affections for Bohr were not unique

to Oppenheimer. Consider Abraham Pais, physicist and friend of Bohr. In his biography of Bohr, Pais forthrightly says, "I loved Bohr."[244]

In 1955, when Oppenheimer wrote of Bohr's "philosophical courage," he was surely in part referring to Bohr's formulation and commitment to the notion of "complementarity." As with Bohr, complementarity plays a significant role in Oppenheimer's thought and overall vision.

The early part of the 20th Century was the birth of two great revolutions in modern physics — relativity and quantum mechanics. Relativity was, in large part, the creation of Einstein; quantum mechanics was the creation of a scientific community. From 1900 to 1930, quantum mechanics was developed with fundamental contributions from such physicists as Planck, Einstein, Heisenberg, and Schrödinger. But Bohr, who also made fundamental contributions to quantum mechanics, was its guiding and interpretative parent. Quantum mechanics presented physicists with problems of empirical and ontological meaning along with a rejection of Newtonian determinism. In 1927, Bohr set forth his notion of complementarity as a response to this crisis. For many, including Oppenheimer, Bohr's use of complementarity provided the means for successfully interpreting quantum mechanics. Consider the following formulation of complementarity set forth in 1950 by Oppenheimer in *Scientific American*.

> The discoveries in physics … revealed the inapplicability of causal, Newtonian physics to problems of individual atomic systems; they uncovered the universal duality between corpuscular and undulatory descriptions of atomic systems. Codified in the powerful formalism of the quantum mechanics, they were in the first instance given an acceptable epistemological formulation in Bohr's principle of complementarity. The basic finding was that in the atomic world it is not possible to describe the atomic system under investigation, in abstraction from the apparatus used for the investigation, by a single, unique, objective model. Rather a variety of models, each corresponding to a possible experimental arrangement and all required for a complete description of possible physical experience, stand in a complementary relation to one another, in that the

> actual realization of any one model excludes the realization of others, yet each is a necessary part of the complete description of experience in the atomic world.[245]

Furthermore, Oppenheimer like Bohr took complementarity as a significant epistemological discovery in physics that reaches well beyond quantum mechanics and even physics itself. Throughout Oppenheimer's works, complementarity with its potential for cultural enrichment is a dominant theme. In fact, many of his works can be taken as demonstrating his commitment to a public understanding of complementarity. In the same 1950 article, Oppenheimer said,

> It is of course not yet fully clear how characteristically or how frequently we shall meet instances of quite close analogy to the complementarity of atomic physics in other fields, above all in the study of biological, psychological and cultural problems. Yet it is clear, as has repeatedly been stressed by Bohr himself, that the discovery of complementarity has provided us with a far wider and more sophisticated framework for the synthesis of varieties of scientific experience. It has refined and extended the pluralism natural to science, and added new elements of subtlety to the idea of dialectic. Indeed, it seems to offer a far richer and more adequate general point of view for the comprehension of human experience than the misleadingly rigid and unitary philosophies that flowed so naturally from the experiences of Newtonian mechanics.[246]

In many of Oppenheimer's single lectures and talks from 1945 to 1966, complementarity is at least mentioned if not discussed. In most of his lecture series, both published and unpublished, complementarity plays a dominant if not a defining role — for example, the Messenger (1946), Reith (1953), James (1957), Trust (1960), Whidden (1962), and Pegram (1963) Lectures. In these lecture series, Oppenheimer attempted to show how complementarity of atomic physics provides insights and understanding into such dichotomies as free will versus determinism, acting versus introspection, causal versus functional explanation, love versus justice, individual versus community, and cultural versus intercultural understanding.

Some additional comments on complementarity might be helpful at this point. Complementarity consists of two features — mutual exclusion and joint completion.[247] For atomic systems, it is held that both space-time descriptions and momentum-energy descriptions are necessary for handling all experimental situations, but only one can be applied or assigned in any one experimental situation. The wave-particle duality of atomic systems, say electrons, is also taken as a case of complementarity. Most important, it is held that the two descriptions cannot be combined in a fundamental, unifying description. An analogy may be of assistance here. Imagine a person with two distinct personalities, but no underlying personality of which the two are manifestations. Since only one personality can be exhibited at a time, this would be a case of complementarity since to fully account for the person's behavior, one must use two complementary descriptions (personalities).

Other cases of complementarity may be found in perception and cognition. "To take one of Bohr's examples, the emotional experience of a piece of music excludes conscious analysis of it, whereas analysis of the music excludes emotional experience. Yet, both approaches are necessary for our understanding of what music is."[248]

Complementarity plays an essential role in Oppenheimer's pluralism, and hence his overall hope and vision. Remember that he took a nonhierarchical, pluralistic view of science — for example, there is no fundamental or foundational science. Interestingly, Oppenheimer appears to allow for a global pluralism with respect to science as whole. In his 1960 lecture "Science and Culture" delivered in Tokyo, Oppenheimer raised the question: "Would another civilization based on life on another planet very similar to ours in its ability to sustain life have the same physics [as we have]?" Oppenheimer answered — "One has no idea whether they would have the same physics or not. One only knows that they would not find insoluble contradictions; they might be talking about quite different questions."[249]

Oppenheimer's response here as well as his pluralism is based in large part on a theme that begins to appear in his works in 1957, namely, that the knower is active and with all knowledge there is loss. Consider the following from Oppenheimer's 1960 Tokyo lecture.

> In every investigation, in every extension of knowledge, we are involved in an action; in every action we are involved in a choice; and in every choice we are involved in a kind of loss, the loss of that we did not choose to do. We find this in the simplest situations. We find this in perception .... in speech .... Meaning is always attained at the cost of leaving things out. One finds it, of course, as a recurring theme of literature, in action. One finds it in the idea of complementarity, in its sharpest form, where it is formally recognized that the attempt to make one sort of observation on an atomic system forecloses others. ...
>
> In practical terms, this means, of course, that our knowledge is finite and never all-encompassing. There is always much that we miss. ...
>
> I say this not at all in a mystical way, but factually, and with modesty.[250]

So for Oppenheimer, the cognitive world is richer than can be conceived by any particular person, discipline, or even culture. No single approach, not even science, can be completely exhaustive.

The general notion — the knower as active and with all knowledge there is loss — is a natural extension of complementarity of atomic physics since the scientist is active in choosing the experimental situation and there is loss due to mutual exclusion. Moreover, such ideas also reflect Oppenheimer's interactions with psychologists. A case in point is Jerome Bruner, who was at the Institute for Advanced Study from 1951 to 1952. Brunner received his PhD in psychology from Harvard in 1941. For decades, he played a major role in the development of cognitive psychology, and co-founded the Center for Cognitive Studies at Harvard in 1961. His 1956 book with George Austin and Jacqueline Goodnow, *A Study of Thinking*, is considered a founding study in cognitive psychology.

In 1958, Oppenheimer published a ten-page review of *A Study of Thinking*.[251] But it is more than a review. It is clear that Oppenheimer is taking this study as supporting his views on science; for example, objectivity as unambiguous communication, the knower as active and with all knowledge there is loss, and the existence of analogies of complementarity in psychological phenomena.

In his 1983 intellectual autobiography, Bruner remarks that Oppenheimer's review was "the most thoughtful in the lot," and says that Oppenheimer caught the theme that he "cared most about" when Oppenheimer wrote that it will now be "natural for psychologists to turn their attention to man as a rational being, and not only to the problems of his appetites, his folly, and his will." Bruner also notes that he was a member of a small psychology committee that met with Oppenheimer "a few times a year at his office in Princeton to 'keep him in the picture' about developments in psychology with the possibility that the Institute [for Advanced Study] might make some appointments."[252]

While complementarity is found throughout Oppenheimer's works, there is discussion in some of his later works of why the topic has been so difficult to communicate to the public and of Oppenheimer's resulting frustrations. For example, the responses to his 1953 BBC Reith Lectures, both as delivered and published, were mixed and must have been disappointing for Oppenheimer. As mentioned in Chapter 3, one book reviewer said they were "written with consummate clarity of thought, and with a beauty of expression that is very nearly poetic." However, other reviewers were not so kind. One wrote that the reception of his lectures "was generally one of bewilderment and disappointment"; another said "many of the examples [of complementarity] he gives are trivial or obscure, and none is developed at any great length." In 1963 at a small informal conference at Mt. Kisco in New York (sponsored in part by the Congress for Cultural Freedom and chaired by Oppenheimer), Oppenheimer even lamented "I spent the Reith Lectures trying to explain it [complementarity], but for my pains was told that I was impossibly obscure about an obvious subject; but it is not obvious; most people do not know what it is all about."[253]

So, according to Oppenheimer, why the difficulty in communicating complementarity to the public? Also, why do certain scientific discoveries and not others have significant effects on the beliefs of a culture? Beyond being intelligible, he mentioned that the discovery must be "relevant to some movement of the human spirit characteristic of the day." More important, the discovery should correct

"some common view which was, in fact, demonstrably in error."[254] For instance, the errors corrected by the Scientific Revolution (e.g., the geocentric view of the universe) and Darwinian evolution (e.g., the creation of man) were errors common to the culture, but the errors corrected by quantum mechanics and complementarity were physicists' errors and hence did not resonate with the culture at large.

Oppenheimer's account here is reasonable but not the whole story. He is certainly correct that the development of quantum mechanics with its indeterminism and complementarity corrected physicists' errors and not errors in the common culture. Also, in his lecture series, he was aware that a large, perhaps inordinate, amount of time was being spent discussing atomic physics as a prerequisite to his discussion of complementarity. Further, complementarity in atomic physics can be a topic filled with confusions even for physicists, so it is not surprising that he had difficulties.

Perhaps more troubling, Oppenheimer was not clear on what he took the philosophical significance of complementarity in atomic physics to be. His views certainly developed over time, and a reasonable interpretation can be presented based on things he said in various works and his overall view of science and culture. Remember Oppenheimer took a pluralistic view of knowledge and culture, and held that action and knowledge are always partial. These views could be taken as exemplified by various dichotomies like free will versus determinism and love versus justice which appear to exhibit mutual exclusion and joint completion. However, such philosophical views are controversial and by no means obvious. This partiality and pluralism could simply be a reflection of an inadequate understanding of human experience and the world, or be based simply on confusion resulting from a naive conceptualization of the world. Further, this partiality and pluralism might vanish once an adequate, unitary understanding is achieved. In other words, the partiality and pluralism supposedly found in experience is not ontologically and epistemologically grounded.

Given the profound instrumental success of quantum mechanics, the significance of complementarity in atomic physics now becomes

apparent. For Oppenheimer, complementarity is integral to the interpretation of quantum theory, a theory that is experimentally robust, not conceptually confused, and will probably not be reduced or replaced by a unitary theory that would eliminate the essence of complementary, namely, mutual exclusion and joint completion. Given this, Oppenheimer has an "ideal type" for complementarity embedded within a scientific framework, that is, he has "the rather sharply defined, nonambiguous, straightforward complementarity … found in the heart of the atom."[255] Since there are analogous cases in human experience of complementarity (i.e., mutual exclusion and joint completion), one has reason to believe that these cases are not based on conceptual confusion or an inadequate understanding of the world, and are reflections of reality. In a 1959 talk at Dartmouth College, Oppenheimer gave an argument in support of this conclusion. He said,

> Yet one has … a relevant parable here, because if it is true that in so simple a thing as physics knowledge is inherently incomplete, that different situations exclude each other, and yet that a rounded description of nature, even of physics, would be sacrificed if one kept only one out of the multiplicity, then it seems reasonable to think that very similar things will be a general feature of a human experience, in which the very first elements of perception and cognition involve choice and involve loss.[256]

Also, one can now see why some of Oppenheimer's examples of complementarity were taken as "trivial." This is because they are already found in ordinary life and in many ways understood. What can be "obscure" are the cases found in atomic physics given the formidable background required to understand them. As Oppenheimer said, "life is full of that [complementary situations], of course. We all know it in the relations between our acts and our introspection, our thinking about our acts. Hamlet has said it better than Planck's constant [found in atomic physics]."[257] In addition, it was probably not clear to many in his audiences that the philosophical significance of complementarity in atomic physics was to provide an ontological and epistemology grounding based on analogy for complementarity in

other domains of human experience, and hence a pluralistic vision of human experience and society.[n]

Quantum mechanics with its indeterminism and complementarity plays an integral part of Oppenheimer's pluralistic vision. First, it eliminates the "Laplacian nightmare" — "of knowing everything about the world right now … and therefore knowing all about its future"[258] — and provides "a much better analogue to the human predicament than could possibly have been built on Newtonian physics."[259] Further, as Oppenheimer said, it "brings an open and human element into the nature of science, very largely absent from the picture of the great machine … that was the Newtonian legacy … until so very recently. It seems to me to make for a more plural and more tolerant notion of the role of science in human life."[260] In other words and most important, *Oppenheimer used complementarity as a means to humanize science.*

Another consequence of this is to remove the "intimidating effect" of science on other parts of human life that are best addressed by thematic discourse with its rational aspects, though not verifiable by scientific approaches. Complementarity offered Oppenheimer a way of reconciling and bringing order to opposing points of view without blending or compromising them. In the end, for Oppenheimer, the ideal is a pluralistic community connected by dialogue and conversation (i.e., "man knowing man") reinforced by an understanding of the nature of science and its significance for cultural coherence and international progress. Oppenheimer's vision of science is humanistic and progressive, and is a rejoinder to attitudes like MacLeish's suspicion of science.

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[n] Literature on Bohr and complementarity is vast. Some writers, including Oppenheimer, take complementarity as a profound insight or discovery. Others take it as confused or at best trivial. In positive terms, complementarity could be taken as a much needed liberation of concepts and a way of reconciling opposing viewpoints. Negatively, it could be taken as simply a form of conceptual complacency or defeatism. For many of Bohr's works on complementarity with background and commentary, see David Favrholdt (editor), *Complementarity Beyond Physics (1928–1962)* Vol. 10 in *Niels Bohr Collected Works* (Amsterdam: Elsevier, Holland, 1999). Also, see Henry J. Folse, *The Philosophy of Niels Bohr: The Framework of Complementarity* (Amsterdam: North-Holland, 1985).

Bohr, Einstein, and Oppenheimer

In concluding this chapter, more needs to be said about Bohr and Oppenheimer. First, they were personally close and had significant intellectual exchanges over several years concerning international issues and philosophical issues such as the epistemological significance of complementarity. Oppenheimer's intellectual debts to Bohr include views on atomic energy and the need for an Open World as well as complementarity and its cultural significance. More particularly, Oppenheimer like Bohr puts strong emphasis on language with objectivity being found in unambiguous communication, and not ontology. In part, this must be coming from Oppenheimer's interactions with Bohr.[o]

Bohr began setting forth his notion of complementarity in 1927 in response to a crisis in the physics community caused by quantum mechanics. Oppenheimer began speaking of Bohr and the significance of complementarity in 1945 in response to a crisis in the international community caused by atomic weapons. Oppenheimer held that the

[o]Bohr and Oppenheimer have other things in common. Bohr never wrote a book on his views on the nature of science and issues like complementarity. Like Oppenheimer, his books are essentially just collections of edited lectures and talks. Also, like Oppenheimer, Bohr is critical of academic philosophers. Consider the following from an interview with Bohr the day before he died: "I felt … that philosophers were very odd people who really were lost, because they have not the instinct that it is important to learn something and that we must be prepared really to learn something of very great importance.… There are all kinds of people, but I think it would be reasonable to say that no man who is called a philosopher really understands what one means by the complementary description.… First of all I would say — and that is the difficulty — that it is hopeless to have any kind on understanding between scientists and philosophers directly." (Interview of Niels Bohr by Thomas S. Kuhn, Leon Rosenfeld, Aage Bohr, and Erik Rudinger on Nov. 17, 1962, Niels Bohr Library & Archives, American Institute of Physics, College Park, MD USA, www.aip.org/history/ohilist/LINK). However, there are things in Bohr's views that are not found in Oppenheimer's. For example, Oppenheimer does not address (at least I have not found anything in his writings) the necessity of classical concepts for describing experience, a central tenet in Bohr's outlook. Also, Oppenheimer cautions that the extension of complementarity may be somewhat more limited than Bohr hoped. (Oppenheimer, Pegram Lecture 1 (ref 264), p. 5).

quantum revolution with Bohr as its central protagonist and the resulting discoveries of indeterminacy, acausality, and complementarity was "an object lesson in the conservation and the transcendence of concepts."[261] Further, the quantum revolution from 1900 to 1930 occurred in the span of a single generation and hence some people (e.g., Bohr, and Oppenheimer in part) could see a whole prototype of the adaptation of human conception to experience.[262] For Oppenheimer, such adaptations almost always occur over longer periods of time (e.g., centuries or even a millennium) and hence are more difficult to perceive and understand.

Oppenheimer took Bohr's views on complementarity and placed them within a more historical, cultural, and communitarian view of science and its relation to society — but a society confronted with international, cultural, and cognitive crises. Most important, Oppenheimer's commitment to complementarity throughout his works, especially in the face of such disappointments as his 1953 Reith Lectures, was not simply sustained by his belief in its importance but was also sustained by his interactions with and personal loyalty to Bohr. Moreover, Oppenheimer may well have viewed himself as a voice speaking on behalf of Bohr since, in Oppenheimer's own words, Bohr is "a very hard man to hear and not entirely easy to follow."[263]

Not surprising, with the death of Bohr in November 1962, Oppenheimer began lecturing on Bohr. For example, Oppenheimer's Pegram Lectures given in August 1963 at Los Alamos consist of three lectures entitled "Niels Bohr and His Times." The three themes of the lectures are "all parts of Bohr's Life — Physics, Philosophy, and Politics."[264] Oppenheimer speaks glowingly of Bohr as "a very resolute and clear and indefatigable thinker and a scientist with lovely imagination," and having had "one of the richest and most beautiful lives, in his family, with his children, with his wife that anyone could wish for."[265]

Being aware of Bohr's influence greatly assists in interpreting many of Oppenheimer's works, in particular, a talk he gave on Einstein. In contrast to his lectures on Bohr, Oppenheimer gave a brief, but controversial lecture on Einstein in December 1965. This talk was given in Paris at a UNESCO conference commemorating the tenth anniversary

of Einstein's death and the fiftieth of his discovery of general relativity. Such notables as Julian Huxley and Werner Heisenberg also spoke. Oppenheimer's lecture was published in March 1966 in *The New York Review of Books* and entitled "On Albert Einstein."

Before an audience of about one thousand, Oppenheimer spoke of Einstein and began by saying "it might be useful … to start to dispel the clouds of myth and to see the great mountain peak that these clouds hide." Of course, he spoke in praise of Einstein but he also spoke in a manner that was critical. Consider the following four excerpts from his lecture.[266]

> In the last years of Einstein's life, the last twenty-five, his tradition in a certain sense failed him. They were the years he spent at Princeton and this, though a source of sorrow, should not be concealed.
>
> And there was an element of the lone worker in him, in sharp contrast to the teams we see today, and in sharp contrast to the highly cooperative way in which some other parts of science have developed.
>
> He had a deep distrust of power; he did not have that convenient and natural converse with statesmen and men of power that was quite appropriate to Rutherford and to Bohr, perhaps the two physicists of this century who most nearly rivaled him in eminence.
>
> He was almost wholly without sophistication and wholly without worldliness. I think that in England people would have said that he did not have much "background," and in America that he lacked "education."

The New York Times on December 14, 1965, characterized Oppenheimer's talk as "warm but not uncritical." Several people were very disturbed by the talk.[p] For instance, Otto Nathan (friend of

[p]For others besides Otto Nathan who were disturbed by Oppenheimer's talk, see Leopold Infeld, *Why I Left Canada — Reflections on Science and Culture* (Montreal: McGill-Queen's University Press, 1978), pp. 173–180. Also, Abraham Pais sent Oppenheimer a letter (December 20, 1965) saying that he saw an account of Oppenheimer's talk in *The New York Times* and it made him "highly uncomfortable." (Box 285, *JRO Papers* (ref. 55)).

Einstein and lawyer in charge of Einstein's estate) attended the lecture and wrote Oppenheimer saying that he "was seriously disturbed by some of the remarks you made about Albert Einstein."[267] Oppenheimer even wrote that "a number of colleagues have suggested that I had been out of my mind."[268]

What should be made of this lecture? In part, Oppenheimer must have seen himself as trying to give balance to the historical record by challenging the "Einstein myth" and helping to put Bohr in proper historical perspective. But there could be more here than that. Remember, Oppenheimer took a communitarian view of science with its offerings of spiritual fruits (e.g., complementarity) to the culture at large. Not only did Einstein oppose the complementarity interpretation of quantum physics, it is Bohr who exemplifies "community" not Einstein. In fact, if anything, Einstein exemplifies the individualistic nature of the scientific endeavor. As Pais says, "Einstein was not a lonely figure. … Nevertheless it was his deepest need to think separately, to be by himself. Bohr, on the other hand, craved togetherness, in life and in thought. Bohr created a major school; Einstein did not."[269]

In his Einstein lecture, Oppenheimer was not out of his mind. He was in character demonstrating his personal loyalty and historical connection to Niels Bohr, and his commitment to complementarity and a communitarian view of science.

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Chapter 7

Oppenheimer — Philosophical Exploration I

At this point, a natural move is to step back and consider Oppenheimer and his thought — and thus his hope and vision of 1957–59 — in a broad, and perhaps more revealing, philosophical light. In this chapter, Oppenheimer's thought is first placed within the general framework which philosophers and other social theorists have called modernity and its various crises. Then, his thought and philosophical outlook are considered from the perspective of American pragmatism in conjunction with particular philosophical issues and themes developed by the American philosopher Richard Rorty. The philosophical exploration continues in the next chapter where the focus shifts more from Oppenheimer's thought to Oppenheimer himself.

Oppenheimer and Modernity

Though used in various and sometimes confusing ways, the term "modernity" is concerned with the formation and emergence of modern society and is often taken to denote the generalized societal state that has emerged during the last four or five hundred years. Whether modernity ended in the 20th Century and post-modernity has arrived is a question of debate among historians, sociologists, and philosophers.[q]

[q]The literature on modernity is extensive. Works that I have found particularly helpful and have used in setting forth this discussion of modernity include: Stuart Hall,

The origins of modernity are found in Europe and North America, and its rise has been associated with various revolutions such as the Protestant Reformation, the Scientific Revolution, and political revolutions like the American Revolution of 1776 and the French Revolution of 1789. Modernity is typically characterized by the rise of urbanization, industrialization, mass democracy, capitalism, and secularism as well as a complex of institutional forms and structures such as the nation state, market economy, and rationalized bureaucracies along with increased specialization. Though its origins are in the West, modernity spread to almost the entire world by the middle of the 20th Century.

Modernity is also characterized by a cluster of philosophical assumptions and attitudes. The belief in material and social progress through reason is essential to modernity. In addition, authority is to be grounded in reason and not in tradition or religion. As expected, science as established by such figures as Galileo and Newton plays a central role in modernity offering both mastery and understanding of the natural world, and possibly the social world as well. Most important, the *autonomous individual* is the philosophical focal point of modernity. As illustrated by Descartes' meditations and his methodical doubt, the individual is the epistemic anchor for belief. In the Hobbesian and Lockean social contracts, the individual is the starting point for constructing and justifying the state. Moreover, meaning and morality moved away from sources like Plato's cosmic order and the Christian God, and were placed in the human realm, and for many reside in the realm of the autonomous individual. Modernity makes strong distinctions between reason and emotion, fact and value, and private and public. In sum, modernity emphasizes individual autonomy and mastery through reason.

David Held, Don Hubert, and Kenneth Thompson (editors), *Modernity: An Introduction to Modern Societies* (Cambridge, MA: Blackwell, 1996); Charles Taylor, *The Ethics of Authenticity* (Cambridge, MA: Harvard University Press, 1992); Stephen Toulmin, *Cosmopolis: The Hidden Agenda of Modernity* (ref. 273); Anthony Giddens and Christopher Pierson, *Conversations with Anthony Giddens: Making Sense of Modernity* (Stanford, CA: Stanford University Press, 1998); and Peter Wagner, *A Sociology of Modernity: Liberty and Discipline* (London: Routledge, 1994).

Given the significant gains and progress of modern society, modernity has many defenders. But modernity has its dark sides as well. Large-scale human exploitation and victimization have resulted from aggressive industrialization and colonization. There have been losses which critics of modernity have found not only unacceptable but dangerous, oppressive, and inhuman. Numerous ills like consumerism and nationalism are associated with modernity as well as various crises — economic crises, the governability crisis of mass democracy, the ecological crisis, and the crisis of industrial warfare which now threatens nuclear warfare and global destruction.

In addition, individuals are engulfed by a crisis of meaning and values that has several dimensions. Life is fragmented into separate spheres yet disciplined by the apparatus of the nation state and other institutions. Moreover, modernity is "disenchanted." According to historian Michael Saler, "This view, in its broadest terms, maintains that wonders and marvels have been demystified by science, spirituality has been supplanted by secularism, spontaneity has been replaced by bureaucratization, and the imagination has been subordinated to instrumental reason."[270] Most alarming, people are alienated and the resources of the autonomous individual are not sufficient to establish meaning and value. Whereas defenders of modernity hold it as liberating and empowering, critics hold it as alienating and disciplining.

Given this overview of modernity, consider Oppenheimer and his thought. Interestingly, many historians hold that "the period after 1945" is "the peak of modernity's development" which is just when Oppenheimer was developing and setting forth his hope and vision.[271] Oppenheimer was obviously addressing some of the crises of modernity, and in particular, the crisis of nuclear weapons and the threat of global destruction. In addition, he spoke to other crises and ills of modernity by developing a humanistic view of science, emphasizing community over modernity's autonomous individual, and calling for breaking the "grip" of the nation state.

As shown earlier, Oppenheimer's humanistic view of science has many dimensions. In contrast to Rabi, he rejected scientism which has been associated with modernity by taking a pluralist, non-hierarchical view of science. Science is like a "network" with no simple unifying

and reductive principles, and he cautioned against "all assertions of totality, of finality, or absoluteness." Oppenheimer softened modernity's fact-value distinction by emphasizing the need and legitimacy of thematic discourse which has been intimidated by an aggressive scientism. His exposition of quantum mechanics with its indeterminism and complementarity stands in stark contrast to the "Laplacian nightmare" — the world as a deterministic machine of particles whose future is fixed. Moreover, Oppenheimer presented the practice of science as embedded in community with meaning and value.

In contrast to MacLeish, Oppenheimer rejected the centrality of the autonomous individual in modernity's thought. Such a position simply reinforces the fragmentation and alienation in modern society, and could mislead us into taking a philosophical view based on social and moral atomism. While maintaining the importance of the individual, Oppenheimer advocated a pluralistic communitarianism with an emphasis on specialized communities. Internationally, many of these communities provide means for undermining state sovereignty from below. Furthermore, such communities offer personal and social meaning along with second-order knowledge or understanding necessary for cultural coherence. Moreover, knowledge (really first-order knowledge) is more a property of specialized communities, not individuals, which results in a kind of "cognitive syndicalism."

In the end, Oppenheimer advocated a dual duty — faithfulness through specialization and cultural coherence through openness and dialogue. For him, an understanding of the modern condition requires us to take the individual as "both an end and an instrument." In other words, one must avoid philosophical theories that attempt to reduce the community to the individual (i.e., social atomism) or reduce the individual to the community (i.e., strong communitarianism). For Oppenheimer, "the antinomy between the individual and the community" is analogous to complementarity in atomic physics.

Though cognizant of the ambiguous nature of modernity and critical of many of its assumptions and ramifications, Oppenheimer was unmistakably modern in maintaining the centrality of science for modern society. Scientific communities are his ideal type of specialized communities, having potentials for internationalism that could

assist in taming the nation state. Also, Oppenheimer took science as an epistemic democratic meritocracy which serves as a worthy prototype for social organization, providing both cultural and personal enrichment.

Given Thomas Kuhn's 1962 *The Structure of Scientific Revolutions* and the "Science Wars" of the 1990s which tended to pit natural scientists against sociologists of science, it is perhaps too easy today to dismiss Oppenheimer and his "enchanted" view of science. Interestingly, in the last few years, the sociologist of science Harry Collins, who is a veteran of the "Science Wars,"[r] has advocated the need for what he

[r]The Science Wars began in the early 1990s as an academic debate and reached the public arena with the Sokal Hoax in 1996. Physicist Alan Sokal submitted a fabricated article entitled "Transgressing the Boundaries: Toward a Transformative Hermeneutics of Quantum Gravity" to the cultural studies journal *Social Text*. The article was published; and shortly thereafter, Sokal revealed that the article was a hoax, saying that it experimentally demonstrated the lack of intellectual standards, obscurantism, and subjectivist thinking of many "progressive" or "leftist" academic humanists and social scientists. Further, at least for Sokal, the hoax exposed the editors' acceptance that "the search for truth in science must be subordinated to a political agenda." For many, the Sokal Hoax was the high (low) point of the Science Wars.

The Science Wars are typically portrayed as a clash between two cultures — the natural scientists versus the postmodern humanists and social scientists in Science and Technology Studies. This conflict is analogous to the bitter clash between C. P. Snow's "Two Cultures" (natural scientists vs. literary intellectuals) and is sometimes taken as an outgrowth of Thomas Kuhn's 1962 book, *The Structure of Scientific Revolutions*. Polarizing dichotomies center around such philosophical issues as objectivity/subjectivity, realism/constructionism, universalism/multiculturalism and such normative issues as proscience/antiscience, power and control/unmasking and liberation, and Enlightenment faith/Postmodern awareness. Perhaps the most prominent philosophical differences separating these sociologists and natural scientists involve epistemological and metaphysical issues concerning the "social construction of scientific knowledge." The sociologists emphasize the social whereas scientists appeal to the reality and objectivity of scientific facts and entities over social constructs. Another issue dividing these warring camps is the progressive nature of science especially in an epistemic sense. Not surprisingly, the sociologists tend to be skeptical of what, if anything, is going on here. Whereas the natural scientists tend to take it as given that science is epistemologically progressive. For an excellent and stimulating conversation about science as well as the Science Wars and an attempt at a Scientific Peace Process, see Jay A. Labinger (chemist) and Harry Collins

calls the "Third Wave of Science Studies" — a call with definite resemblances to Oppenheimer's views on science.[272]

According to Collins, the first wave "drawing on the success of physicists during the Second World War" took an "enchanted view" of science. It emphasized science as "the ultimate form of knowledge" and the individual scientist as epistemologically privileged, and claimed a synergy between political democracy and the normative structure of the scientific community. Wave two, "a child of the broader cultural revolution of the 1960s," focused more on the social construction of scientific knowledge and took a more skeptical view of science and its public persona. For Collins, "The recent dominance of this second wave has unfortunately led some from science studies and the broader humanities movement known as post-modernism to conclude that science is just a form of faith or politics.… [and] have become overly cynical about science."

The third wave of science studies would "redirect the focus from truth to expertise." For Collins as well as Oppenheimer, focusing on expertise and specialization rather than truth portrays the scientist as craftsman, not epistemic priest. This protects "science against the danger of claiming more than it could deliver" and promotes policy deliberations involving scientists and the public. Further, it warns us about scientists who move beyond their expertise. Like the second wave, Collins takes science "as a form-of-life rather than a logically coherent set of procedures." Most important, science as a form-of-life is constituted through "a distinctive set of values" or "formative intentions." This set includes (1) free criticism of ideas, (2) basing knowledge claims on evidence, (3) integrity and honesty in gathering evidence and reporting results, (4) clarity and unambiguous presentation, (5) taking all claims as fallible, (6) separating science from politics, and (7) universalism which holds that claims are evaluated independent of such things as race and gender.

What Collins means here by "formative intentions" is not necessarily the intentions or values in the everyday life of the scientist but

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(sociologist), *The One Culture? A Conversation about Science* (Chicago: University of Chicago Press, 2001).

the essential characteristics that constitute the scientific life. For example, these would be values and intentions that could be openly expressed and not subject to criticism by scientists and observers of science, and would be promoted by the members of scientific community. Hence, if one appeals to political conformity instead of empirical evidence for a "scientific" claim, one is no longer doing science and is subject to criticism. Collins, like Oppenheimer, clearly holds that science is a form-of-life instantiated by individuals but maintained through community.

Collins holds that "the third wave is needed to put science back in its proper place." Most significantly, he proposes that we "choose, or 'elect,' to put the values that underpin scientific thinking back in the center of our world" — in particular, universalism, free criticism of ideas, recognition of the value of expertise, and the proper separation of science from politics. Collins refers to his position as "elective modernism" to contrast it with "post-modernism." In all likelihood, Oppenheimer would welcome Collins' Third Wave; but he would place more emphasis on the importance of expertise or specialization for second-order knowledge which is vital for cultural coherence, and would highlight the essential role of the specialized communities of science in breaking the "grip" of the nation state.

In his influential 1990 book, *Cosmopolis: The Hidden Agenda of Modernity*, historian and philosopher of science Stephen Toulmin takes our task to be "to reform, and even reclaim, our inherited modernity, by *humanizing* it." Central to this task is to "move beyond the absolute nation-state."[273] Like Oppenheimer's, Toulmin's vision is not to build something larger and more powerful than the nation-state, "let alone a 'world state' having absolute, worldwide sovereignty." His vision "is to fight the inequalities that were entrenched during the ascendancy of the nation-state, and to limit the absolute sovereignty of even the best-run nation-states."[274] For Toulmin, subnational and transnational organizations like Amnesty International will play vital roles in providing adaptive ways for moving us beyond the absolute nation state and closer to a world of justice and a world without war. Though such organizations do not have the power of

force like the nation state, they have the power of influence and can restrict and bind the actions of states.

Toulmin portrays his vision in a section entitled "From Leviathan to Lilliput." Lilliputian organizations like Amnesty International cannot force the Leviathan state to do anything. But like Gulliver, "waking from an unthinking sleep," the Leviathan state will find itself "tethered by innumerable tiny bonds" of Lilliputian organizations.[275] Toulmin does not explore the potential of specialized communities devoted to the production and use of knowledge as ways of limiting the nation state. With Toulmin's picture in mind, Oppenheimer might point out that such specialized communities could be among the strongest, and perhaps the most numerous, of the bonds tethering the Leviathan state.

Oppenheimer's hope and vision arose during "the peak of modernity's development." Though it is not a solution to the crises of modernity, his vision is certainly part of any solution especially with respect to transcending the nuclear crisis. By humanizing science and emphasizing the power of community, he pointed us in the right direction and suggested means for moving forward.

Oppenheimer and Pragmatism — Richard Rorty

In his book *Einstein and Oppenheimer: The Meaning of Genius*, Silvan Schweber makes a case that Oppenheimer was profoundly influenced by the views of the American pragmatists, and much of his thought can be taken as "a form of neo-pragmatism." Pragmatism is a philosophical movement or tradition that originated and was developed in the United States during the last third of the nineteenth century and the first part of the twentieth century by three American philosophers — Charles Peirce, William James, and John Dewey. It became "the most influential philosophy in America in the first quarter of the twentieth century" and "has been the most distinctive and the major contribution of America to the world of philosophy."[276] With its emphasis on the social and the centrality of practice, pragmatism rejected much of the traditional academic philosophy of its time (e.g., absolute idealism, neo-Kantianism, British empiricism) and maintains that truth resides in instrumental success.

Schweber's line of reasoning for the influence of pragmatism on Oppenheimer has several dimensions. For one, he holds that as an undergraduate at Harvard it was "likely that Oppenheimer had audited courses that had made him read some of the writings of William James, Charles Peirce, and John Dewey." Further, one of the lecturers for the freshman course in the history of philosophy which Oppenheimer took was Ralph Barton Perry, who was a student and later a colleague of James. Perry edited the papers of James and received a Pulitzer Prize in 1936 for his book *The Thought and Character of William James.*[277]

Second, Schweber maintains that as a Harvard Overseer and especially as a member of the Visiting Committee for the department of philosophy, Oppenheimer "acquired a critical overview of contemporary philosophical inquiries and practices" and interacted with such philosophers as Morton White and Willard Quine as well as Perry, who was also a member of the Visiting Committee.[278] Schweber contends that these experiences and interactions "led Oppenheimer to carefully restudy Peirce, James, and Dewey" with the result that "Many of his public lectures in the late 1950s and early 1960s echo the views that Peirce, James, and Dewey had expounded."[279]

Schweber focuses especially on White who is a philosopher and historian of ideas. White received his PhD in philosophy from Columbia in 1942 with his dissertation *The Origins of Dewey's Instrumentalism*, and was a member of the Harvard philosophy department from 1948 to 1970. White had some interactions with Dewey but never knew him very well, and characterizes himself as a "selective admirer of Dewey."[280]

Interactions between White and Oppenheimer began as early as the fall of 1953 when White provided Oppenheimer some written remarks and suggestions for his upcoming Reith Lectures.[281] At that time 1953–54, White was a visiting member at the Institute for Advanced Study. He would again be a visiting member during 1962–63 while Oppenheimer was still director, and become a permanent member and professor at the Institute in 1970. When Oppenheimer gave his William James Lectures at Harvard in 1957, White was chairperson of the philosophy department. According to Schweber, Oppenheimer's interaction with White, "primarily through

the reading of his books and essays on pragmatism," deepened Oppenheimer's philosophical outlook.[282] White's book *Toward Reunion in Philosophy* (1956), a good deal of which was written while he was at the Institute during 1953–54, as well as his books *Social Thought in America* (1947) and *The Age of Analysis* (1955) provide in-depth, lucid presentations of the American pragmatists.

Third, Schweber looks closely at Oppenheimer's William James Lectures delivered in 1957, which he takes as "one of the clearest expositions of what he [Oppenheimer] had hoped he might accomplish as a public intellectual."[283] In these lectures, Oppenheimer said he had read James and quoted him several times as well as mentioned Pierce. Though there is no explicit reference to Dewey, Schweber holds that "it was the views of Dewey that underlay Oppenheimer's presentation."[284]

Many of Oppenheimer's ideas and themes fall within the pragmatic tradition — rejection of absolutism and acceptance of anti-foundationalism and fallibilism, "emphasis on the performative aspect of knowledge", and openness to the richness of experience and the world. In his first lecture, Oppenheimer said that he admired "James because he fought against limitation and preconception; against the applicability of ideas from which specifics could be deduced; against certitude, against doctrine, against system."[285] Furthermore, Oppenheimer took the pragmatic position that science is a self-corrective, communal inquiry and serves as a worthy model for democratic society. In addition, philosophy is to be broadly conceived, related to practice, and cautious of its own specialization.

The actual influence of pragmatism on Oppenheimer is difficult to ascertain in detail and some cautionary remarks are in order. As Schweber notes, reactions to Oppenheimer's James Lectures were mixed. According to White, "Students and nonphilosophers on the faculty, like I. A. Richards, loved them and applauded wildly, whereas the philosophers were on the whole disapproving."[286] In a letter to the philosopher and historian of ideas Isaiah Berlin, White wrote that the Oxford legal philosopher H. L. A. Hart, then a visiting professor at Harvard, was "outraged" by Oppenheimer's first lecture, but fortunately Billy James, the son of William James, "loved" both it as well as

Oppenheimer.[287] Further, like his Messenger Lectures (Cornell, 1946) and Trust Lectures (Queen's University in Canada, 1960), Oppenheimer's James Lectures were never published though Oppenheimer in all likelihood had "high hopes" for them.[288] In addition, though Schweber argues that White and his writings influenced Oppenheimer's thought, White said in a 1999 interview (by the author) that he remembered quite distinctly interacting with Oppenheimer but never "having a serious philosophical exchange with him."[289]

As Schweber stresses, Oppenheimer's thought and faith arose from several sources with components ranging from "his Ethical Culture upbringing with its emphasis on human welfare and *noblesse oblige*" to Hindu thought and the *Gita*[s] with its emphasis on duty as well as from Bohrian complementarity and American pragmatism.[290] Though the formative influence of Bohr and his notion of complementarity on Oppenheimer's thought is apparent, the formative influence of pragmatism is less so. However, even if not overly formative, pragmatism was at least sustaining and supportive of his thought.

To illustrate this, consider Peirce's influential 1878 paper "How to Make Our Ideas Clear" published in *Popular Science Monthly*. In his paper, Peirce sets forth for the first time his pragmatic theory of meaning of a concept saying — "Consider what effects, that might conceivably have practical bearings, we conceive the object of our conception to have. Then, our conception of these effects is the whole of our conception of the object."[291] He then illustrates this by relating such physical concepts as "hard" and "force" in Newtonian mechanics over to sensible or observable effects. What is important here is that the meaning of an idea or concept is not what it pictures or mirrors in so-called reality but is to be taken as a conjunction of practical or observable, and hence testable, conditionals, such as, if x is done then y results. Among Peirce's goals is to eliminate metaphysical disputes as well as vagueness and ambiguity.

The similarity here to Oppenheimer's taking objectivity as unambiguous communication is apparent. In his first James Lecture,

[s]For an in-depth discussion of the influence of Hindu thought, in particular the *Gita*, on Oppenheimer, see James A. Hijiya, "The *Gita* of J. Robert Oppenheimer," *Proceedings of the American Philosophical Society* **144** (June 2000), pp. 123–167.

Oppenheimer even speaks of objectivity as measuring the degree to which communication lacks ambiguity, which is "the application of the pragmatic method, even the more ruthless applications of logical positivism, which do work in eliminating ambiguity and establishing this kind of objectivity …."[292] Further, there are definite similarities between Peirce's pragmatic meaning and Percy Bridgman's operationalism of physical concepts that he set forth in his book *The Logic of Modern Physics.* Oppenheimer published a review of his former teacher's book in 1928 though he did not mention Peirce.[293]

Another illustration is the pragmatist account of experience, for instance, sense perception. Experience is taken as an ongoing interaction of the person or organism and the environment with knowledge arising due to the activity of the organism with its interests and selective attention.[294] This account rejects the "spectator theory of knowledge" with the organism being passive and like a "blank tablet." Consequently, the classical dualism of Descartes consisting of the mind with its ideas and the external world with its objects is avoided.

Moreover, the Cartesian quest for certainty along with its questioning of even the existence of the external world simply does not arise. In addition, the empiricist's goal of knowledge resting on a "sense datum" foundation is shown to be an illusion. For many pragmatists, such attempts are not only misguided but have been debilitating for Western philosophy. Connections with Oppenheimer's views of the knower as active and with all knowledge there is loss, which are topics in his James Lecture, are obvious. Further, his remarks at the 1959 Basel seminar that modern professional philosophy has overemphasized "the role of certitude," which has not only "stunted philosophy" but has in large part removed it from the public sector, come to mind as well.

There are clearly other ways in which pragmatism is supportive and sustaining of Oppenheimer's thought. Like Oppenheimer, most pragmatists have a deep appreciation of science and place strong emphasis on pluralism, the communal and social nature of knowledge, learning as doing, and philosophy having a crucial public role. Further, both place importance on the claim that philosophical

questions and views should "arise out of the perplexities that confront us in the course of experience [and inquiry]."[295] For Oppenheimer, Bohr's atomic struggles and his resulting views on complementarity would be a case in point.[t] However, there is a strong, cautionary remark here. Pragmatists are suspicious of sharp dualisms (e.g., mind-world, fact-value, freedom-determinism) and seek to eliminate or overcome them. On the other hand, Oppenheimer, like Bohr with the notion of complementarity, takes dualisms as reflective of experience and possibly of the world as well.

In the first part of the 20th Century, pragmatism was the most influential philosophy in America, but by the 1940s it "had lost much of its momentum and prestige."[296] When Oppenheimer gave his 1957 James Lectures, analytic philosophy had come to dominate English-speaking, academic philosophy. Among its founders were Frege, Russell, Moore, and Wittgenstein, and its emphasis was on linguistic analysis with a high regard for logic, clarity, and rigor in argumentation. Pragmatism had fallen out of favor and was taken as "vague and hazy." Moreover, "the age of grand synoptic philosophizing" had drawn to a close and "the age of piecemeal problem-solving and hard-edged argument" was underway. However, within the internal developments of analytic philosophy itself, certain pragmatic elements began to appear especially in the works of such eminent philosophers as W. V. O. Quine and Hilary Putnam, to name only a few. By the early 1980s, pragmatism was experiencing a revival especially due to the high-profile, controversial efforts of the American philosopher Richard Rorty, who claimed Dewey as his "philosophical hero."

Rorty, like Oppenheimer, was born in New York City. His parents, James and Winifred, were college-educated and socially and politically active intellectuals, though not academics. Though they had "gravitated in a Communist orbit early in their lives" and "later

[t] Bohr certainly read some of the works of William James. Henry J. Folse makes a case in his book, *The Philosophy of Niels Bohr: The Framework of Complementarity* (Amsterdam: North-Holland, 1985) pp. 49–51, that Bohr might have become "acquainted with James' philosophical *psychology* as early as 1904" and this could have had some influence on Bohr's development of the notion of complementarity in 1927.

joined the ranks of the Trotskyist [anti-Stalinist] New York left," they became "vigorously anti-Communist" by the 1950s.[297] Like Oppenheimer, James Rorty became a member of the Congress for Cultural Freedom. Though critical of American society and "without abandoning their commitment to social justice", Rorty's parents "came to appreciate the freedoms and democratic potentials of American society" and instilled in their son that "leftism and patriotism went hand in hand."[298] Moreover, with Dewey nearby at Columbia University and the philosopher Sidney Hook, who was a family friend and called "Dewey's Bulldog," pragmatism was part of the Rorty household.

In 1946, at the young age of fifteen, Rorty enrolled in so-called Hutchins College at the University of Chicago with its emphasis on the great books of the Western tradition, a curriculum that made I. I. Rabi "so very unhappy." Rorty continued at Chicago getting a Master's degree in philosophy in 1952 with a thesis on Whitehead's metaphysics. After this, he went to Yale and completed his doctorate in 1956 with a dissertation entitled "The Concept of Potentiality" that "reviewed and assessed the adequacy of employment of this and related concepts in three philosophical systems: that of Aristotle; the seventeenth-century rationalists Descartes, Spinoza, and Leibniz; and the logical empiricists."[299] It is important to note that Rorty had significant interest and training in the history of ideas as well as the history of philosophy; and at this time "offered himself up as a translator" between analytic approaches, which brushed aside the history of philosophy, and nonanalytic approaches which did not.[300]

After two years in the army and three years teaching at Wellesley College, Rorty accepted a position in the philosophy department at Princeton in 1961 and would remain there for over twenty years. Unlike Chicago and Yale, Princeton was a bastion of analytic philosophy, and during "the 1960s and early 1970s Rorty earned a reputation as a smart analytic philosopher who was also well versed in the history of philosophy."[301] In 1982, Rorty left Princeton to become Kenan Professor of Humanities at the University of Virginia. In 1998, he left Virginia and became Professor of Comparative Literature at Stanford University, a position he held until 2005 when he became

Professor Emeritus of Comparative Literature and Philosophy. During his life, Rorty received numerous honors and awards. For example, during the 1980s he was awarded a MacArthur "genius grant" with a stipend of nearly $250,000.[302]

Rorty's break with analytic philosophy came with his book *Philosophy and the Mirror of Nature* published in 1979, the same year he was president of the prestigious Eastern Division of the American Philosophical Association. Later, with his 1982 publication *Consequences of Pragmatism*, "Rorty fully identified his intellectual project with pragmatism."[303] Rorty's attack charged that the representational view of knowledge — that the mind is like a mirror — had generated fundamental mistakes in Western philosophy. It had lead to such false dualisms as mind/body and objective/subjective and the ill-founded pursuit of certainty by seeking a foundation for knowledge. This epistemological project running from Plato through Descartes to its linguistic reincarnation in analytic philosophy is not only bankrupt but has placed philosophy outside the public sphere. With its current ideology of specialization, this misguided philosophy presents itself as a master discipline — the "guardian of rationality" — that judges the claims of other disciplines. According to Rorty, instead of representation, our quest should be pragmatically oriented seeking intersubjective agreement and social solidarity.

As developed by the sociologist Neil Gross in his book *Richard Rorty: The Making of an American Philosopher*, the standard interpretations that "Rorty started out as a hard-nosed analytic philosopher and only later came to doubt the value of the analytic program" are mistaken.[304] Though internal developments in analytic philosophy were important for Rorty's break, it must be remembered that Rorty's early training at Chicago and Yale engendered in him a much broader conception of philosophy than found in most analytic philosophers. Many of his colleagues were "narrowly focused" and struck him as "arrogant." To a significant degree, his break with analytic philosophy was his intellectual return to his parents' activism which had been nurtured and developed in the environment of American pragmatism.

Not surprising, Rorty's break received heavy criticism in the philosophical community with charges ranging from relativism to

philosophical showmanship. Some philosophers sympathetic with or working in the pragmatic tradition accused him of distorting the classical pragmatists and expressed serious reservations about his interpretation of pragmatism. Though he had some support inside philosophy, most of his support came from scholars in other disciplines, especially the humanities. In the public sector, he was widely discussed and was denounced by members of both the far left and the far right. In 2003, the BBC ran a documentary "provocatively titled *Richard Rorty: The Man Who Killed Truth.*"[305]

As expected, due to pragmatic ideas and themes in Oppenheimer's thought, there are definite similarities between his thought and Rorty's such as a strong anti-foundationalism and pluralism. Both moved to soften the distinction between science and nonscience, and took science as a suggestive model for other areas of culture. In his 1987 article "Science as Solidarity," Rorty sounding much like Oppenheimer writes,

> there is plenty of reason to praise the institutions they [scientists] have developed and within which they work, and to use these as models for the rest of culture. For these institutions give concreteness and detail to the idea of "unforced agreement." Reference to such institutions fleshes out the idea of "a free and open encounter" — the sort of encounter in which truth cannot fail to win.[306]

Both Oppenheimer and Rorty rejected the centrality of epistemology and the quest for certainty and insisted on a more public role for philosophy. They emphasized the communal and social, and took conversation as essential for deepening and widening "cultural coherence" and "solidarity."

Not surprising, there are differences, in fact deep differences, between their views. Science is given a prominent, almost defining, role in Oppenheimer's thought whereas Rorty takes a deflationary view of science. Concerning the individual and society, Rorty makes "a firm distinction between the private and the public" treating "the demands of self-creation and of human solidarity as equally valid, yet forever incommensurable."[307] For Oppenheimer, though this may be

analogous to instances of complementarity in atomic physics, he held that there are definite mechanisms for alleviating and perhaps even transcending the dichotomy of the individual and society — such as specialization embedded in community, and dialogue among specialized communities themselves as well as the public at large.

Nonetheless, both Oppenheimer and Rorty took themselves as patriotic Americans on the political left. Though only too aware of the failings of the United States, they took "pride in being citizens of a self-invented, self-reforming, enduring constitutional democracy."[308] Each offered a vision of social hope and advocated reform, not revolution, in which America would have a prominent role. However, neither were symbols for the American Left. Oppenheimer was too much of an insider and a member of the political center, and had made the atomic bomb. In his 1994 op-ed "The Unpatriotic Academy" in *The New York Times*, Rorty even chastised many of his colleagues for becoming "increasingly isolated and ineffective" and stressing that "An unpatriotic left has never achieved anything."[309]

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Chapter 8

Oppenheimer — Philosophical Exploration II

Using philosophical ideas and themes developed by the British philosopher Bernard Williams as well as the American philosopher Richard Rorty, the exploration continues and moves deeper into the realm of philosophical biography. In this chapter, the philosophical exploration now considers not only Oppenheimer's thought and philosophical outlook, but Oppenheimer himself.

Oppenheimer, Moral Dilemmas, and Moral Luck — Bernard Williams

At the 1959 Basel Seminar sponsored by the Congress for Cultural Freedom, Oppenheimer criticized people like the eminent philosopher Bertrand Russell, who had advocated World Government and an idealistic move to disarmament, for not engaging the "deep ethical dilemmas" because they denied their existence. Oppenheimer reminded his audience that "there have been crucial moments [e.g., 1945 and 1949] in which the existence of a public philosophical discourse … could have made a great difference in the moral climate and the human scope of our times." Interestingly, during the last fifty years or so, philosophers have redeemed themselves, at least in part, since they have certainly engaged the subject of moral dilemmas. Central to this effort is the work of Bernard Williams, who is considered by many as

"the most brilliant and most important British moral philosopher of his time."[310]

According to common sense, a person is in a moral dilemma when a person is in a morally difficult situation and does not know what to do. For the sake of clarity and exposition, philosophers have something more specific in mind. For example, a working philosophical definition of a moral dilemma could be defined as follows: a person or agent is in a moral dilemma when an agent is in "a situation where [the] agent has a *strong* moral obligation or requirement to adopt each of two alternatives, and neither is [morally] overridden, but the agent cannot adopt both alternatives."[311] A well-known example for illustrating this is the student of Jean-Paul Sartre whose brother had been killed by the Germans during the Fall of France in 1940. The dilemma was whether the young man should join the Free French in England to fight the Nazis or remain in Paris and care for his grieving mother.[312]

The central issue among philosophers is whether, appearances aside, there are genuine moral dilemmas. Philosophers in the utilitarian (e.g., John Stuart Mill) and duty-based (e.g., Immanuel Kant) traditions have generally argued against moral dilemmas.[313] Their emphasis has been the rational coherence of ethics through foundational principles. For example, utilitarianism maximizes utility and Kantianism universalizes duty. In contrast, philosophers who defend moral pluralism (e.g., Isaiah Berlin) commonly argue for genuine moral dilemmas.[u] "Moral pluralism is the view that moral values, norms, ideals, duties and virtues are irreducibly diverse," and hence allows for the possibility of irreducible moral conflict.[314] However, moral pluralism does not deny moral theory, only that such a theory cannot be formulated in a hierarchical way with one value taking precedence over all others.

With Oppenheimer's pluralist, non-hierarchical view of science, it is not unreasonable to assume that he would endorse a pluralist, non-hierarchical view of morality (i.e., moral pluralism), and hence

[u] For an insightful overview and interpretation of Berlin's thought centered on "value-pluralism" with connections to moral dilemmas, see John Gray, *Isaiah Berlin — An Interpretation of His Thought* (Princeton: Princeton University Press, 2013).

recognize the possibility of genuine moral dilemmas. Remember he chastised Russell for denying the existence of "deep ethical dilemmas."

But there is more here. In his discussions of extensions of complementarity of atomic physics to other domains of human experience, Oppenheimer mentioned love versus justice. Assuming moral dilemmas exist, love-justice is a domain in which to expect moral dilemmas. Love deals with the personal (e.g., the family); justice deals with the impersonal (e.g., the state). Sophocles' *Antigone* might be a case in point. Just as important, moral dilemmas exhibit the structure found in complementarity — mutual exclusion (one alternative or the other, but not both), joint completion (only two alternatives), and loss through choice (a moral obligation not fulfilled). At the small informal conference in 1963 at Mt. Kisco mentioned earlier, Oppenheimer interestingly attributes to Bohr a generalization involving some of these ideas, saying that before his discovery of complementarity in atomic physics,

> He [Bohr] was disturbed by the fact that really to love, and really to be just, are not in the end compatible, and that societies are judged by us very largely by the measure in which these two important but complementary ideals are reconciled, complementary in the sense that the full pursuit of one destroys the other, and complementary in the sense that without both something is very much lost from human life.[315]

In 1965, less than two years before Oppenheimer died, the philosopher Bernard Williams published his influential essay "Ethical Consistency" where he argues for genuine moral dilemmas from the phenomenology of moral experience, not from the framework of rationalistic ethics. Holding that philosophical accounts of morality must be sensitive to psychological reality, he defended that "moral conflicts are neither systematically avoidable, nor all soluble without [moral] remainder."[316] By moral remainder, he means such things as guilt, shame and, in this particular essay, regret.

Williams takes moral conflicts (dilemmas) as analogous to conflicts of desire, not conflicts of belief. In conflicts of belief, once one of the beliefs is taken as true the epistemic force of the other

disappears, and this belief is eliminated or silenced. However, in conflicts of desire, once one of the desires is satisfied the other desire still remains and has emotive force. For Williams, moral dilemmas are like conflicts of desire in that acting on one of the moral oughts does not eliminate or silence the other ought. This remainder is typically expressed by regret for what has not been done.

It is important to realize that for Williams having regret does not imply that the agent believes that he acted wrongly or he would act differently if he had it to do over. Though moral remainders, like standard cases of feeling guilty, imply the agent believes that he acted wrongly, others clearly do not. For example, survivor guilt does not imply that one believes that he acted wrongly or even that he acted. Furthermore, experiencing regret is not a bad thing and has its morally redeeming aspects. Regret can show that the agent understands the depth of the moral conflict, has not silenced the other voice or ought, and in some ways suffers as well. The essence of Williams' argument is that philosophical accounts of morality must take into account both reason and the moral emotions. His essay is taken as a founding text in the philosophical area of moral psychology and a caution against all attempts which seek unity and harmony in morality through systematic, objective reason.

As scientific director of Los Alamos, Oppenheimer most probably believed that he faced profound moral conflicts. Whether he also believed at the time, or came to believe, that he faced genuine moral dilemmas is difficult, perhaps impossible, to answer. His talk at the Basel seminar suggests that he did. His attraction to complementarity and his sustained effort for its public understanding are also suggestive.

In very general terms, any scientific director of Los Alamos would have faced the dilemma of something like an obligation-ought versus a prohibition-ought. As director, one would have strong obligations to the United States, members of the Manhattan Project, and American soldiers and their families to support the combat use of the atomic bomb. But such an atomic attack would mostly likely be against civilians, given the US strategic bombing campaigns of Japan and Germany. Hence, there would be a strong moral requirement against the combat use of the atomic bomb due to the prohibition not

to deliberately target and attack civilians even in wartime. In addition, utilitarian arguments could be given for both alternatives.

As director, Oppenheimer might not have taken this as a genuine moral dilemma since he may have believed that the prohibition-ought was overridden.[v] For example, due to the decisions and actions of others, Japanese civilians were already in harm's way, independent of the atomic bomb, since they were being targeted and attacked in the conventional bombing campaign. Further, there is always the "Godlike decision" that it would take "Hiroshima to bring the world to a consciousness of what another war might mean."

Oppenheimer never publically professed regret about his involvement in the Manhattan Project. As noted in a previous chapter, in 1965, he even publically said, "I never regretted, and do not regret now, having done my part of the job." This is possibly because he took "regret" as implying that one believes one has acted wrongly. In any case, in the eyes of his biographers as well as his friends, Oppenheimer had and suffered from moral remainders.[w]

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[v]Such eminent philosophers and political theorists as John Rawls and Michael Walzer hold that the prohibition against targeting and attacking civilians can be overridden given "supreme emergency." They use the case of the years 1940 and 1941 when Britain was essentially alone and "a Nazi victory in Europe was frighteningly close." For them, the British decision to bomb German cities and hence target and attack the civilian population, though regrettable, was morally justified. However, they hold that "supreme emergency" did not hold for Hiroshima and Nagasaki, and hence these were great moral wrongs. By way of contrast, philosopher Charles Landesman argues that "supreme emergency" did hold for Hiroshima and Nagasaki and hence were morally justified. See John Rawls, "Fifty Years after Hiroshima," *Dissen*t (Summer 1995); Michael Walzer, "Emergency Ethics" (1988) in *Arguing about War* (New Haven, CT: Yale University Press, 2004); and Charles Landesman, "Rawls on Hiroshima," *The Philosophical Forum* (Spring 2003).

Further, one might say that the situation surrounding the decision of whether to use atomic bombs on Hiroshima and Nagasaki simply overwhelms morality. Williams says that there can be "extreme cases of moral conflict, tragic cases" where "the notion of 'acting for the best' may very well lose its content." (Williams, "Ethical Consistency" (ref. 316), p. 123). Clearly, for Rawls, Walzer, and Landesman, this was not the case for Hiroshima and Nagasaki.

[w]Oppenheimer and guilt is a subject discussed by Oppenheimer biographers and scholars; and Oppenheimer may have not only regretted involvement with the atomic

In 1976, moving along a related moral path, Williams in conjunction with the American philosopher Thomas Nagel, introduced the notion of moral luck.[317] As Williams later remarked, he expected it would suggest an oxymoron. One can be lucky at cards, business, and even academics, but morality appears to be an arena free of luck. The idea behind moral luck is that one's moral status and responsibilities are to a large extent based on factors beyond one's control, that is, matters of luck.[318] Philosophers have distinguished and discussed various candidates for moral luck. Of particular interest for us are what philosophers have called resultant moral luck and circumstantial moral luck.

An example of resultant luck would be two "equally" negligent drivers (e.g., texting on their cell phones) where one hits a child who just happens to walk into the street and the other gets home without any accident since no children were in the street. The unlucky driver will be judged harshly and have considerable responsibilities to the child and its family, face a possible prison term, and feel terrible and have difficulty living with himself. Though subject to criticism for what might have happened, the lucky driver is free from most of this. Another example given by Nagel is the case of someone who "launches a violent revolution against an authoritarian regime."[319] If the revolution succeeds, the leader could very well be a moral hero. If not, the leader could be an object of scorn and bear significant guilt and responsibilities for what the people suffered.

An example involving circumstantial luck would be the case of young Germans during the Nazi regime. By simply being in Germany, these young people faced the frightful moral test of whether to collaborate with the Nazis. Many failed, but others were lucky since

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bomb but may have had guilt feelings as well. In his *Oppenheimer: The Tragic Intellect*, Charles Thorpe insightfully writes "Oppenheimer seemed to be in a pendulum swing of guilt … … [Jeffries] Wyman [an old friend] thought that Oppenheimer in his later years 'was almost reveling in his feeling of guilt about the bomb.' But at the same time, 'it was obviously a great achievement and a very important thing in his life … and there was a kind of play back and forth between these two attitudes.'" (Thorpe, *Oppenheimer: The Tragic Intellect* (ref. 27), p. 285).

they had left Germany, say to be with relatives in the United States, and never faced such a test.[320]

Not surprising, since Williams and Nagel first introduced this notion, philosophers have debated the issues that arise concerning moral luck. Many argue that upon reflection moral luck is seen to be illusory while others argue that it is genuine and reflects something important, perhaps paradoxical, in moral thought.

From the perspective of moral luck, can anything be said about Oppenheimer and his involvement in the atomic bomb project? Perhaps he was similar to the unlucky young Germans by being put to the moral test by circumstantial luck. Oppenheimer as well as other senior officials of the Manhattan Project like Conant certainly faced moral trials. Granted there are differences; for example, Oppenheimer freely joined the Manhattan Project and could have avoided participation whereas the young Germans were simply in Germany when the Nazis came to power. However, in certain ways, Oppenheimer was morally pressured, perhaps even morally compelled, to join the project given his expertise in atomic physics and the threat of a Nazi atomic bomb. Indeed in February 1943, Oppenheimer wrote Rabi who was unwilling to join the Manhattan Project that "I do not think that the Nazis allow us the option of carrying out that development [the atomic bomb]."[321] Clearly, Oppenheimer did not intentionally seek out his moral ordeals, so perhaps he was morally unlucky through no fault of his own.

In what ways and to what degrees Oppenheimer failed or succeeded are questions worth exploring — biographically, historically, and ethically — and are matters of debate.[x] However, even if

[x]For a philosophical discussion, see Richard Mason, *Oppenheimer's Choice* (ref. 321). However, Mason only focuses on Oppenheimer's choice to become scientific director of Los Alamos in 1942, and does not consider in any detail decisions and choices that happened later such as Oppenheimer and the decision to use the atomic bomb and the H-bomb controversy of 1949. His approach is insightful and helpful with use of philosophers such as Plato, Augustine, Descartes, Spinoza, and Nietzsche. Mason takes "Oppenheimer's Choice" as providing the opportunity not only of "thinking about Oppenheimer" but also of providing the opportunity of "thinking about thinking about Oppenheimer" (that is, reflection on moral philosophy).

everything that Oppenheimer did was justified and he did the best he could, he still might have been morally unlucky here. Doing, participating in, and contributing to certain actions (e.g., killing in wartime) that violate deep-seated moral principles tend to damage one's moral sensitivity and destroy one's innocence even when justified.[322]

Does the idea of resultant moral luck apply to the atomic bomb project? Though most discussions of moral luck focus on individuals, some of the ideas surrounding moral luck carry over to groups and their projects. The historical significance of the Manhattan Project was the technological invention and then the production and use of atomic weapons. How this project and to a certain extent Oppenheimer (since he is symbolic of the project) are viewed is to a considerable extent based on the resulting atomic threat and its ramifications. Clearly these could not be foreseen and are in some sense "beyond the control of the project." If the threat has a significant part in ending all major wars, the project could be viewed favorably — in particular, if the Acheson–Lilienthal initiative had succeeded.[y] If the threat leads to atomic warfare, the project would certainly be condemned.

Oppenheimer's last day as director of Los Alamos was in October 1945. At an outdoor ceremony, with "virtually the entire population of the mesa assembled," Oppenheimer accepted on behalf of the laboratory a Certificate of Appreciation from General Groves sent by the Secretary of War Henry Stimson. In a short speech, he said

> It is our hope that in years to come we may look at this scroll, and all that it signifies, with pride.
>
> Today that pride must be tempered with a profound concern. If atomic bombs are to be added as new weapons to the arsenals of a

[y] One could contend that the decision to use the atomic bomb, and perhaps even building it, with the goal of ending all war is simply too risky, or beyond morality, or even "Godlike," to be spoken of as morally justified even if it results in ending all war. This seems to be part of Reverend Young's criticism of James Conant. However, other reasons might morally justify such a decision with the possibility of ending all war being morally supportive of (but not justifying) the decision.

> warring world, or to the arsenals of nations preparing for war, then the time will come when mankind will curse the names of Los Alamos and of Hiroshima.[323]

Later in November at Los Alamos, Oppenheimer spoke of atomic weapons as "not only a great peril, but a great hope" — like the passage above, these words capture the historical contingency (i.e., the moral luck) of the legacy of the Manhattan Project.

Much of Williams' article "Moral Luck" is concerned with an agent's reflective, retrospective assessment of his own decisions and actions. Williams' development centers around a story of a man, whom he calls "Gauguin," who abandons his family "in order to live a life in which, as he supposes, he can pursue his art." His pursuit to become a "creative artist" is realistic but cannot be foreseen, and the claims of his family have a hold on him. Williams contends that "in such a situation the only thing that will justify his choice [to himself] will be success itself" and hence Gauguin's justification is in "some ways a matter of luck."[324]

In addition, if Gauguin fails to become a creative artist, it matters considerably for his retrospective assessment on how he fails. If he "sustains some injury on the way to Tahiti which prevents his ever painting again," he suffers from extrinsic luck and "his decision … was for nothing." But this does not show that "he was wrong and unjustified." However, if he fails because of lack of talent or an inability for sustained effort, then the failure is intrinsic. His project is proved worthless and he is left "with the most basic regrets." So "Some luck, in a decision of Gauguin's kind, is extrinsic to his project, some intrinsic; both are necessary for success, and hence for actual justification, but only the latter relates to unjustification."[325]

Moreover, it needs to be emphasized that for Williams, even if Gauguin succeeds and can justify himself, this does not bring "it about that those who suffer from his decision will have no justified ground of reproach."[326] There has been a "moral cost." However, Gauguin's "moral luck … does not lie in acquiring moral justification," though he might have it, rather it lies in the relation of his life to morality. Since claims beyond the artistic have a hold on Gauguin,

he will have regrets. Consequently, if he fails, there will be no "perspective within which something else could have been laid against them." To a "moral spectator" that can make a difference, for Gauguin runs "a risk within morality" and his life is "recognizably part of moral life."[z,327]

As is apparent, such a decision and its project are "very risky" and "substantial in a special way." This is because

> With an intrinsic failure, the project which generated the decision is revealed as an empty thing, incapable of grounding the agent's life. With extrinsic failure, it is not so revealed, and while he must acknowledge that it has failed, nevertheless it has not been discredited, and may, perhaps in the form of some new aspiration, contribute to making sense of what is left. In his retrospective thought, and its allocation of basic regret, he cannot in the fullest sense identify with his decision, and so does not find himself justified; but he is not totally alienated from it either, cannot just see it as a disastrous error, and so does not find himself unjustified.[328]

Oppenheimer and his involvement with the Manhattan Project and attempts for the international control of atomic energy bear similarities to Williams' Gauguin and his artistic quest. Oppenheimer not only symbolized the Manhattan Project, he was a central figure in the project and identified with it — he had recruited scientists, directed its central laboratory, and participated in major decisions. Further, his influence, fame, and reputation were based on its technical success. He likewise identified with attempts at the international control of atomic energy, especially the Acheson–Lilienthal initiative, so intimately tied to the legacy of the Manhattan Project. If the

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[z] It should be noted that Williams holds that morality of today suffers from "a genuine pathology" by presenting itself as "supreme" and "ubiquitous" as well as free from moral luck. Williams' account of Gauguin illustrates that though morality shapes Gauguin, it does not determine him. For Williams, this "limitation of the moral is itself something morally important." (Williams, "Moral Luck" (ref. 317), pp. 52–53). Williams' positive account which he calls "ethics" not "morality" is in the tradition of Aristotelian ethics with its emphasis on the virtues.

Acheson–Lilienthal initiative or something similar had succeeded, the legacy of the Manhattan Project could perhaps be progressively grounded, and might serve to ground Oppenheimer's retrospective assessment of himself. However, such initiatives failed and with them so had Oppenheimer. In deep and personal ways, Oppenheimer was morally unlucky.

In many respects, Oppenheimer took the failure of the international control of atomic energy as extrinsic to the project. In 1947 and 1948, he spoke of the arguments given in the Acheson–Lilienthal Report as "correct arguments" and "in some ways eternal arguments." He spoke of extrinsic causes for the failure like costly delays and the mistakes on the part of the United States and, most important, the non-cooperation of the Soviet Union arising from its ideology and monopoly of state power. In other ways, the failure appeared intrinsic to atomic energy itself since its most beneficial aspect (atomic power generation) was long term but its threat immediate.

Though the early attempts at the international control of atomic energy failed, Oppenheimer could take them as not being discredited and "perhaps in the form of some new aspiration, contribute to making sense of what is left." In 1957, Oppenheimer said "the sovereign, unlimited, all-powerful nation-state is a pretty deadly and impossible form for the organization of mankind." Taking this as the most controlling extrinsic factor for the failure of such attempts as the Acheson–Lilienthal initiative, Oppenheimer's hope and vision presented in the 1950s would "contribute to making sense of what is left" with its goal of breaking the "grip" of the nation state and moving us toward a world without war and free of nuclear weapons. Such a move would naturally embrace substantial initiatives like the Acheson–Lilienthal plan. In addition, Oppenheimer called for communities embarked on specialized work to help pacify and redirect the nation state.

In important ways, the next two chapters on Oppenheimer and international relations assist in underwriting the above interpretation. First, it will be argued that the goal of a world free of nuclear weapons cannot be dismissed as simply utopian. This can be more easily seen today given the collapse of the Soviet Union and the end of the Cold

War in conjunction with detailed and mature works like *Abolishing Nuclear Weapons* by John Perkovich and James Acton. Moreover, such a move can even be placed within a broad theoretical framework as illustrated by Daniel Deudney's nuclear one-worldism with its strong resemblances to the Acheson–Lilienthal plan. Most important, it will be shown that the successful Nuclear Nonproliferation Treaty, with its pillars of peaceful use of nuclear energy and disarmament, has a structural likeness to the Acheson–Lilienthal plan. These results support Oppenheimer's contention that the ideas and arguments of the Acheson–Lilienthal proposal are "correct" and in some sense "eternal," and hence its failure at the UN was not an "intrinsic failure." Finally, it will be established that Oppenheimer's vision and his call for specialized communities to undermine the nation state falls within a liberal-constructivist tradition in international relations, and is strengthened by David Mitrany's international functionalism as well as contemporary studies of epistemic communities.

Oppenheimer and Narrative — Richard Rorty

Other dimensions of Oppenheimer and his thought can be explored by considering Rorty's book *Contingency, Irony, and Solidarity*, which was published in 1989 and has been translated into at least 22 languages.[329] Of particular interest is Rorty's chapter on the novelist George Orwell.

Essential to Rorty's book and many of his other works is the importance of conversation in society and hence vocabularies. For him, knowledge is a matter of conversation and social practice and not an attempt to represent or mirror nature. Vocabularies play a prominent role by determining what can be communicated, and suggesting and limiting what can be believed — in other words, they form and limit conceptual perception and perhaps even perception itself.

For Rorty, the primary aim of intellectuals, and especially philosophers, should be "to edify — to help their readers, or society as a whole, break free from outworn vocabularies and attitudes, rather than to provide 'grounding' for the intuitions and customs of the present."[330] Furthermore, "Interesting philosophy is rarely an

examination of the pros and cons of a thesis." It usually occurs as a contest between vocabularies — especially between an "entrenched vocabulary which has become a nuisance and a half-formed new vocabulary which vaguely promises great things."[331] Producers of new vocabularies range from Aristotle to Nietzsche to Dewey as well as Galileo to Darwin to Freud.

Speaking pragmatically, vocabularies are tools and there is no ideal or all-inclusive vocabulary. The task of philosophy is to invent new vocabularies and explore possibilities, not to ascertain the language of the world. As is apparent here, Rorty's ideas resonate with Oppenheimer's views that the aim of philosophy should be thematic, not propositional, discourse as well as his pluralism. Remember that Oppenheimer's pluralism holds that the cognitive world is richer than can be conceived by any particular person, discipline, or even culture, and that no single approach (or vocabulary), not even science, can be completely exhaustive.

The chief aim of Rorty's book is "to show that the vocabulary of Enlightenment rationalism [centered on universal reason, truth, and moral obligation], although it was essential to the beginnings of liberal democracy, has become an impediment to the preservation and progress of democratic societies." Rorty then introduces his own candidate vocabulary as "a redescription of liberalism" with the hope that "culture as a whole can be 'poeticized' rather than … 'rationalized' or 'scientized.'"

For the political structure of society, Rorty advocates constitutional democracy but makes a strong distinction between the private and the public. The private is concerned with individual self-creation and the public is concerned with human solidarity, and for Rorty these two cannot be unified in theory. In large part, this is because for Rorty, the self does not have an essence or intrinsic nature. Therefore, treating the demands of self-creation and of human solidarity as equally valid yet incommensurable, we should aim for a society which lets "its citizens be as privatistic, 'irrationalist,' and aestheticist as they please so long as they do it on their own time — causing no harm to others and using no resources needed by those less advantaged." Moreover, this incommensurability is reflected in the fact that the "vocabulary of

self-creation is necessarily private, unshared, unsuited to argument" whereas the "vocabulary of justice is necessarily public and shared, a medium for argumentative exchange."

Rorty's ideal citizen is the "liberal ironist." This person would hold that what unites humans is not some essence or even a common private vocabulary, but just the shared "susceptibility to pain and in particular to that special sort of pain … humiliation." The ideal citizen is "liberal" by holding "that cruelty is the worst thing we do" and that suffering should be diminished and that humiliation of human beings by other human beings should cease. However, this citizen is an "ironist" by facing "up to the contingency [both historical and philosophical] of his or her own most central beliefs and desires" and hence one's own "final vocabulary" — that is, the "set of words" which one employs "to justify their actions, their beliefs, and their lives." Further, the ideal final vocabulary would "split into a large private and a small public sector, sectors which have no particular relation to one another."

Rorty discusses the work of intellectuals and artists mainly in terms of books. Given a strict public-private distinction, he suggests that "we distinguish books which help us become autonomous from books which help us become less cruel." With respect to becoming less cruel, he further distinguishes "books which help us see the effects of social practices and institutions on others" and "those which help us see the effects of our private idiosyncrasies on others." With the aim of eliminating cruelty, Rorty gives the key role to works of literature, especially the novel, and not to works in theology, science, or philosophy. Novels serve to sensitize us to the pain and humiliation of others, and hence play crucial roles in social reform, moral education, and reform in our private relations. Novels are safer and more revealing by dealing with the human situation through individual lives rather than principles of abstract theory.

Rorty devotes an entire chapter to Orwell by focusing on two of his novels — *Animal Farm* published in 1945 (the year of the atomic attacks) and *Nineteen Eighty-Four* published in 1949 (the year of MacLeish's "The Conquest of America"). For Rorty, "Orwell was successful because he wrote exactly the right books at exactly the right time." These books did two jobs in alerting us to

the dangers confronting the world after World War II — "redescribing" the Soviet Union and "inventing" the character O'Brien.

The redescription of the Soviet Union not only alerted us to the cruelty and suffering behind the Iron Curtain, but "broke the power of … 'Bolshevik propaganda' over the minds of liberal intellectuals in England and America." O'Brien is the antagonist in *Nineteen Eighty-Four* who ends up torturing and reeducating Winston, the novel's protagonist. According to Rorty, Orwell's creation of the character O'Brien is not so much to alert us to a contemporary danger like the Soviet Union, but a warning of a real possibility of totalitarianism in the future — the complete subordination of the individual through psychological manipulation plus physical and technological control. Such a totalitarianism is not ordained by human or societal nature, but a contingency of a future that is "up for grabs." For Rorty, Orwell's critique of the "Communist oligarchs" and totalitarianism along with his "earlier warnings against the greedy and stupid conservatives" remain as useful as anything we possess even today.

Furthermore, Rorty emphasizes that for Orwell the twentieth century is the period when "human equality became technically possible." With this in mind as well as Orwell's post-war critique, Rorty presents his fellow liberals with a challenge reminding them that they are "still at the drawing board."

> I do not think that we liberals *can* now imagine a future of "human dignity, freedom and peace." That is, we cannot tell ourselves a story about how to get from the actual present to such a future. We can picture various socioeconomic setups which would be preferable to the present one. But we have no clear sense of how to get from the actual world to these theoretically possible worlds, and thus no clear idea of what to work for. … We liberals have no plausible large-scale scenario for changing that world so as to realize the "technical possibility of human equality."[332]

For Rorty, such a narrative of social hope concerned with means for moving forward has become harder to tell in a convincing way since the end of World War II.

Though Rorty holds that liberals cannot as yet tell such a story, he surely believes that he has an outline for such a story. First, the means to realize the "technical possibility of human equality" are not to be found in something which stands beyond contingency, history, and institutions such as religious appeals or even theories advocated by Enlightenment rationalism or Marxism. Further, Rorty must take his vocabulary of self-creation and human solidarity as a step forward. Not surprising, progress will be made by greater human solidarity which is created by extending the "we," that is, extending our "ability to see more and more traditional differences … as unimportant when compared with similarities with respect to pain and humiliation." Using such devices as novels and ethnographies, modern intellectuals' principal contributions to moral progress are given by "detailed descriptions of particular varieties of pain and humiliation." By way of caution, Rorty reminds us that appeals for solidarity are strongest when the "we" denotes "something smaller and more local than the human race."

Although developed and presented around the time of the publication of Orwell's two novels, Oppenheimer's hope and vision can be taken, not only as a dimension of his responsibility to see "what came of this [atomic] revolution," but also as providing a response to Rorty's later challenge of 1989 that liberals are "still at the drawing board." In many ways, Oppenheimer can be seen as offering a narrative as well as a new vocabulary centered on community, complementarity, and Bohr's vision of an Open World.

In the years immediately after the war, the international control of atomic energy was taken as a means for moving the world towards internationalism and a world without war. As argued in this book, with the failure of such efforts as the Acheson–Lilienthal initiative and the start of the Cold War, Oppenheimer began setting forth a less grand, and more long-term, narrative. Essential to this narrative are international communities of people embarked on specialized work which serve as important means to lead us forward and break the "grip" of nationalism, and possibly transcend the nuclear revolution. Furthermore, with a personal dual duty of "faithfulness and firmness" to one's specialty and "great openness to others" along with philosophy as a vital contributor to the thematic discourse of the public sphere, the crises of

modernity are moderated and solidarity deepened and extended. Interestingly, specialized communities have a two-dimensional role in Oppenheimer's thought. Specialized communities furnish means for mitigating "the antinomy between the individual and the community" with a call for cultural coherence as well as means for mitigating the atomic crisis with a call for a world without war.

It is instructive to compare Rorty and Oppenheimer on the private and the public (i.e., the individual and society). Rorty holds for a strict separation while Oppenheimer allows for a merging and intermingling of the private and the public. For Oppenheimer, this separation is mitigated since people reach their potential only in a diversity of open communities connected with the past and committed to action in the present. Coherence within and between communities requires a unity or solidarity of men brought about by action and dialogue.

In particular, Oppenheimer holds that specialized communities, especially in sciences, offer ways of bridging and combining the public and private. Remember that for Oppenheimer one obtains personal enrichment and develops such virtues as epistemic honesty and cooperation through specialization within community. Also, knowledge is not so much a property of individuals but rather a property of specialized communities — a kind of "cognitive syndicalism." Finally, these communities of people embarked on specialized work have a progressive public function by furnishing means for overcoming nationalism and making room for solidarity.

Though Oppenheimer moves away from Rorty's strong private-public split, he does not reach the theoretical limits found in Marxism and Christianity. As Rorty notes, Marxism with its historical materialism and proletarian revolution "has been the envy of all later intellectual movements because it seemed, for a moment, to show how to synthesize self-creation and social responsibility," that is, to theoretically and historically unify the private and the public.[333] In an analogous way, Christians unify the private-public split by seeking private perfection by living for others.

Nonetheless, Oppenheimer's bonds between the private and the public, as exemplified by his specialized communities, are taken as

strong and serve to bridge the private-public split. Such communities provide advocates and receptive audiences embedded in practice, provide robust and concrete means connected to utilitarian needs and internationalism, and move us forward towards human equality and a world without war. Further, Oppenheimer might contend that Rorty's position is dangerously close to simply taking modernity's autonomous individuals and placing them in a theoretical vacuum, and raising the specter of a debilitating relativism. Thus, Oppenheimer avoids the radical individualism of MacLeish and the scientism of Rabi and his universal culture of science.

Beyond literature and its vital role for extending our sense of solidarity, Rorty says little in *Contingency, Irony, and Solidarity* about other means for extending and deepening human solidarity. Similarly, Oppenheimer says little about the nature of thematic discourse which he takes as vital for cultural coherence and solidarity. A major criticism of the visions of both Rorty and Oppenheimer is that their "social glue" is simply not thick enough. However, by borrowing from each other — Rorty emphasizing something like Oppenheimer's pluralist communitarianism and Oppenheimer emphasizing Rorty's literary means for solidarity as a vital part of thematic discourse — both can thicken the social glue.

In his account of Orwell's novel *Nineteen Eighty-Four*, Rorty has an intriguing but unsettling discussion of the reeducation and torture of Winston, the novel's protagonist, by O'Brien. Concerning torture, Rorty writes

> But people can, their torturers hope, experience the ultimate humiliation of saying to themselves, in retrospect, "Now that I have believed or desired *this*, I can never be what I hoped to be, what I thought I was. The story I have been telling myself about myself — my picture of myself as honest, or loyal, or devout — no longer makes sense. I no longer have a self to make sense of. There is no world in which I can picture myself as living, because there is no vocabulary in which I can tell a coherent story about myself." … If one can discover that key sentence and that key thing, then, as O'Brien says, one can tear a mind apart and put it together in new shapes of one's own choosing.[334]

For Winston, it came with his betrayal of Julia, his lover and companion in rebellion against Big Brother. Taken to Room 101 where one's worst fear resides, Winston broke and said "Do it to Julia!" With that sentence, with that action, he would never be able to reconstitute himself (never be able to develop a final vocabulary to redescribe himself) and could no longer justify himself to himself. In psychological terms, the narrative unity of his life ended and could not be put back together again.[aa]

With the above ideas from Rorty in mind, I would like to conclude this philosophical exploration by proposing a possible portrayal of Oppenheimer. Shortly after the war, even with the atomic threat, a case could be made that Oppenheimer had a "plausible large-scale scenario" for realizing the "technical possibility of human equality" based on redescribing our public world — Bohr's Open World beginning with the international control of atomic energy. But once this redescription failed, the liberal imagination was unable to redescribe the public sphere by constructing a plausible scenario or narrative leading us forward to a future of "human dignity, freedom and peace."

At the same time, there was certainly another attempt at redescription but now in the private sphere. Given his significant involvement in the development of the atomic bomb and the decisions for its use (e.g., the "Godlike decision"), Oppenheimer was confronted with a crisis calling for personal redescription. However, once the redescription in the public sphere failed, Oppenheimer could not develop a final vocabulary to redescribe himself. In other words, he could not justify himself to himself, and in some ways he became self-tortured.

[aa] Psychology has much to say here; in particular, narrative psychology is an area of psychological research and used in therapy. The literature in this area is extensive. For a recent book, consider Dan P. McAdams, Ruthellen Josselson, and Amia Lieblich (editors), *Identity and Story: Creating Self in Narrative* (Washington, DC: American Psychological Association, 2006). Philosophers also have much to say here as well. For recent articles consider Galen Strawson, "Against Narrativity," *Ratio* **XVII** (2004), pp. 428–452 and Anthony Rudd, "In Defence of Narrative," *European Journal of Philosophy* **17** (2009).

Historically, from Rorty's perspective, Oppenheimer is among the few individuals whose redescription in the private sphere depended so crucially on a redescription in the public sphere where the individual was a major actor in shaping the public sphere. In other words, Oppenheimer was historically placed in a game of big stakes and he was morally unlucky both personally and publically. A twist of fate here is that Rorty's private-public split is intimately joined, almost unified, in Oppenheimer's attempts at redescription.

This portrayal of Oppenheimer like others (e.g., Freeman Dyson's characterization of Oppenheimer as an Atomic Faust[335]) surely paints things as more focused and momentous than they were. Things evolved and developed over time. Most important, Oppenheimer's hope and vision of 1957–59 should be seen as a continuing response by Oppenheimer to fulfill responsibilities that arose from his "having played an active part in promoting a revolution in warfare." Indeed, this hope and vision of the 1950s could be interpreted as an attempt to redescribe the public sphere and "contribute to making sense of what is left."

Nevertheless, the intimate union between his attempted, public and private redescriptions shortly after the war in all likelihood remained with him, and at times materialized in his public expressions. In 1947, there was his unsettling admonition that "physicists have known sin." In 1959 at Basel, Oppenheimer lamented that "In 1945 [decision to use atomic bomb and early attempts at international control], in 1949 [hydrogen bomb controversy], and perhaps now, there have been crucial moments in which the existence of a public philosophical discourse … could have made a great difference in the moral climate and human scope of our times."

Chapter 9

Oppenheimer and International Relations

The discipline of contemporary international relations provides both theoretical and empirical resources for examining and illuminating Oppenheimer's thought and philosophical outlook. Such resources also serve to further clarify and even evaluate his thought. In this chapter, the emphasis is general and theoretical. In the next chapter, the focus narrows to the nuclear revolution with special emphasis on nuclear proliferation and disarmament.

As emphasized in this chapter, the three dominant theoretical approaches to international relations — realism, liberal internationalism, and constructivism — assist in categorizing and probing Oppenheimer's thought. Connections are then drawn between Oppenheimer's vision and the functional approach developed by David Mitrany, who was a colleague of Oppenheimer's at the Institute for Advanced Study. In addition, Oppenheimer's communal view of science and his emphasis on cognitive communities embarked on specialized work are shown to have clear affinities to the concept of "epistemic community" as advanced by international relations theorists such as Peter Haas in the 1990s.

Most important, the overall exploration in these two chapters furnishes coherence and grounding to Oppenheimer's thought by placing it within the traditions of international relations theory, and hence reveals that he again offers something of value that reaches beyond the symbolic. Moreover, central to Oppenheimer's overall vision is transcending the nuclear revolution by opening up the

possibility for nuclear disarmament and moving towards a world without war. The degree to which such an aspiration can be placed into a narrative structure using international relations theory is critical to how one views Oppenheimer and his thought and, in all likelihood, how Oppenheimer viewed himself.

Realism, Liberal Internationalism, and Constructivism

Realism with its emphasis on competition and power between nation states was the most influential approach to international relations when Oppenheimer set forth his hope and vision in the late 1950s. Realist thought became dominant shortly after World War II and still remains so, though not to such a strong degree. Liberal internationalism with its emphasis on democracy as well as international law and cooperation between states arose in large measure as a response to the catastrophe of World War I and was the dominant school of international relations up to World War II. For realists, idealism (e.g., League of Nations), which is natural to liberal internationalism, had ironically led in part to the outbreak of World War II. Interestingly, constructivism with its emphasis on ideas and social construction in international relations became a significant approach after the unanticipated and peaceful end of the Cold War.

Each of these 20th Century theoretical perspectives traces its origins back in history. Realism reaches back to such philosophers as Thomas Hobbes and his anarchic state of nature and even to Thucydides of ancient Greece, liberal internationalism to Immanuel Kant and Enlightenment optimism, and constructivism to Friedrich Hegel and German Idealism. Each perspective attempts to be descriptive, and hopefully explanatory, as well as prescriptive and hence normative. Nevertheless, given the complexity and the multi-causality of international relations, many theorists are wary of wholeheartedly taking just one approach, and recommend using the insights and resources of all three. That is, they recommend a methodological pluralism. Moreover, even given that realism is more systematic and simplifying in its assumptions than the other two approaches, one needs to realize that not even all realists are of one voice.

Realism. In realistic thought, states which are the key actors of international relations are self-interested and power-seeking. Hence, the overriding concerns of a state are and should be its national security and survival. International law and morality are in general ineffective, and serve as screens for "power politics" between states. For many, realism paints a grim, egoistic, and hence pessimistic picture of international relations. Classical mid-20th Century realists like Hans Morgenthau and the American theologian Reinhold Niebuhr tended to take the ruthless nature of international relations as arising from the failings of human nature — humans are selfish and aggressive.

In 1979, Kenneth Waltz revitalized the realistic tradition with the publication of his book *Theory of International Politics,* putting in place what is now called structural realism or neorealism. He offered a more "scientific" approach (along the lines of microeconomics and game theory which analyses competition/cooperation between firms and players) to international relations by characterizing and investigating the structure of the international system and its systemic imperatives. Moreover, he simply dismissed, and hence avoided, the reductive and ontologically suspect move of grounding the nature of the international relations on the failings of human nature.[336]

For Waltz, the central ordering principle of the international system is anarchy, not in the sense of chaos, but in the sense that among states there is no central authority or enforcer. Given that states are self-interested and fundamental interests do conflict, power politics results and the international system becomes a "self-help" system. In understanding international relations, the focus is on the distribution of power and hence the capabilities among states whose primary concern is national security. As a case in point, states may appear to join together and cooperate for altruist reasons, but on closer inspection their cooperation might be seen as simply a balance of power against a stronger state.

Further, neorealism downplays domestic politics as well as the restraining force of morality and international law on the behavior of states. Most important, it significantly downplays non-state actors like international institutions. For Waltz, "realists believe that international institutions are shaped and limited by states that found and

sustain them and have little independent effect. … [resulting in] the subordination of international institutions to national purposes."[337]

The international arena, which is epitomized by struggle and competition as well as permeated by insecurity and uncertainty, is certainly dangerous for the neorealist. Nevertheless, international relations are understandable. Above all, the danger does not arise from the failings of human nature or some "original sin." Rather, "It is the basic situation [namely, international anarchy] that is dangerous" and human beings are obliged to work within it.[338] States are instructed to be watchful and constantly aware of the realities of self-interest and power. In particular, realism counsels against utopian thinking that can lead to such reckless undertakings as moral crusading and other unnecessary interventions.

Liberal Internationalism. Though realism was the dominant approach to international relations when Oppenheimer set forth his hope and vision in the 1950s, liberal internationalism was still prominent and has now moved to center stage, especially since the end of the Cold War. For liberalism, realistic thought is narrowing and too simplifying in its assumptions. It is fixated on the state as the key actor in international affairs and too security-focused. Moreover, conflict and hence power politics are taken as the essence of international affairs. In many ways, realism regards states like billiard balls with no internal structure or dynamics and capable only of collision.

Liberal internationalism is less systematic than realism and more wide-ranging in its concepts and assumptions. Thus, liberal internationalism could well be conceived as a cluster of interrelated and reinforcing ideas, principles, and themes. As John Ikenberry, in his 2009 article "Liberal Internationalism 3.0: America and the Dilemmas of Liberal World Order," writes

> At its most basic, liberal internationalism offers a vision of an open, rule-based system in which states trade and cooperate to achieve mutual gains. Liberals assume that peoples and governments have deep common interests in the establishment of a cooperative world order organized around principles of restraint, reciprocity, and sovereign equality. There is an optimist assumption lurking in liberal internationalism that states can overcome constraints and cooperate

> to solve security dilemmas, pursue collective action, and create an open, stable system. … Across the decades, liberal internationalists have shared the view that trade and exchange have a modernizing and civilizing effect on states, undercutting illiberal tendencies and strengthening the fabric of international community. Liberal internationalists also share the view that democracies are — in contrast to autocratic and authoritarian states — particularly able and willing to operate within an open ruled-based international system and to cooperate for mutual gain.[339]

Whereas realism has a singular view of the interdependence between states grounded in competition and national security, liberalism with emphasis on cooperation as well as competition has a more pluralistic and complex view of interdependence ranging from commercial and cultural ties to international organizations and international law. While realism downplays domestic politics, liberal internationalism puts a strong emphasis on domestic politics and the virtues of democratic states, and hence on the spread of democracy. Not surprising, realists tend to view the United States as just another self-interested state which happens to be a very successful great power whereas liberals tend to view as the United States as exceptional in its promotion of liberalism and international order.

Liberal internationalism emphasizes mutual gains through a network of cooperation among states based on such means as open markets and collective security. Such a network undercuts the competitive and security-focused character of the international system, and offers the opportunity for a prosperous and peaceful world. Central to this network are international and supranational institutions and organizations (e.g., United Nations, World Bank, European Union, Nuclear Nonproliferation regime, multinational corporations). Such mechanisms not only coordinate activities and bring to light new possibilities, but serve to constrain and even limit the sovereignty of states. Whereas realists downplay international institutions, liberals stress their potential as well as their real power. Furthermore, liberal internationalists not only see nation states, but they see a common humanity which further confines the state conceptually and morally as well as legally (e.g., international treaties on human rights).

Given its optimistic assumptions and belief in progress, liberal internationalism is both a theoretical perspective and, according to its proponents, a project as well. However, with the recent international and perhaps domestic "decline" of the United States along with its assumed centrality to the international liberal order, some argue that today this project is threatened and may soon end.[340]

Realists view other states as necessarily foes since their reality is one of competition and the necessary conflict of interests. Liberal internationalists view other states as potentially friends since their hope is one of cooperation and the potential harmony of interests. Realists emphasize conflict, anarchy, and relative gain whereas liberals emphasize cooperation, progress, and mutual gain. Realists downplay the power of morality and international institutions whereas liberals do not.

Constructivism. Though realism and liberal internationalism have significant differences, they are similar in their underlying ontological and epistemological assumptions. First, they take a structural/system-levels approach to international relations with an emphasis on reason — rational self-interest for realism, enlightened but morally constrained self-interest for liberalism. Just as important, they take the identities and interests of their key actors — states for realism, states and other actors like international organizations for liberalism — to be relatively stable if not fixed over time.

Constructivism takes a more sociological approach holding that the identities and interests of these collective entities (e.g., states) are not fixed, and hence in need of explanation. Further, identity changes become a fundamental dynamic of the international system and hence are vital in explaining international relations. In large measure, identities are socially constructed through mechanisms that range from the progressive (e.g., open political debate) to the illiberal (e.g., mass propaganda), but ideas are key to constructivism. Consequently, "Constructivists contend that their theory is deeper than realism and liberalism because it explains the origins of the forces that drive those competing theories."[341] Also, the essence for the constructivist is process rather than behavior of fixed, rational agents in a fixed structure.

At this point, it is helpful to turn to a discussion of constructivism by the international relations theorist Andrew Phillips.[342] To begin, he frames part of his discussion in what he calls the "rationalistic-constructivist divide." Given similarities between realism and liberalism and such analytic approaches as rational-actor theory from microeconomics, this divide is characteristic of the divide between realism/liberalism and constructivism. From an ontological perspective, rationalists and constructivists differ on three points according to Phillips.

"First, constructivists are philosophical idealists rather than materialists," where the assumption is that realists and liberals emphasize material structures and causes in exclusion to, or at least over, ideational structures and causes. The idealism here is not ethical but ontological in the sense that ideas, and hence meaning and norms, are essential for explaining and understanding international relations. In particular, ideas are not simply reflections of the material realm.

"Second, constructivists posit a mutually constitutive relationship between agents and structures." The identities of agents are "governed by the normative and ideological structures that they inhabit" but these structures are in turn "sustained by patterns of social practice that are produced and reproduced through the actions of these agents." For instance, "The international system is therefore seen by constructivists as being a constitutive rather than merely a strategic domain" for states. "This position contrasts with rationalists' belief that agents [states] are analytically separable from the environments they inhabit, and that the study of international politics consists of the study of agents' instrumental pursuit of presocial interests that remain constant over the course of social interaction."

Third, "rationalists and constructivists diverge in their conceptions of the dominant logics governing agents' actions. Behavior through constructivist eyes is seen as essentially norm-driven, with states seeking to ensure a correspondence between their own conduct and internalized prescriptions for legitimate behavior that states have derived from their identities .... Far from being of purely ornamental value, norms exercise a profound influence on state behavior ...." In contrast, rationalists believe that "agents' behavior is governed not by a logic of appropriateness but merely by a logic of consequences.

States through this optic are conceived as rational egoists pursuing interests formed exogenously to social interaction in a rationally instrumental manner … ."

Given such ontological disagreements between rationalists and constructivists, it is unsurprising that there are epistemological and methodological differences. For instance, as pointed out by Phillips, given that social construction surely results in fundamental diversity, constructivist approaches appear to "preclude the possibility of developing all but the most elementary transhistorically or transculturally valid claims about international politics … . This contrasts with rationalists' conviction that there exists sufficient commonality in state behaviors across different cultural and historical contexts as to warrant the development of law-like generalizations about international politics, and their concomitant belief in the possibility of developing robust predictive claims about global politics on the basis of these generalizations."

With regard to normative guidance, it must be appreciated that realism and liberal internationalism are more systematic than constructivism by having definitive views regarding the state and the international system. Further, realism and liberalism in contrast to constructivism are each "explicitly anchored within a broader philosophical tradition" and hence tend to be grounded on distinctive prescriptive and normative claims.[bb] Hence, the moral guidance that constructivism can offer is less definitive and clear than realism and liberalism.

Nonetheless, constructivism has something profound to offer the moral realm. As highlighted by Phillips, given that the identities and interests of agents are not fixed and can be transformed (say "by the force of logical argument"), constructivism leads one "to infer far greater possibilities for expanding the moral boundaries of political community than may be discerned in either realism or all but the

[bb]For the case in point, "realism draws its insights from a Hobbesian conception of the state of nature and is imbued with a pessimism regarding the prospects for human progress that has its foundations in theology as much as the social sciences." Whereas "liberals subscribe to a Lockean conception of the state of nature and are conversely informed by an optimism about humanity's capacity to effect transformative social change that is anchored firmly within the tradition of the Enlightenment … ." (Phillips, "Constructivism" (ref. 342), p. 69).

most radical streams of liberalism." Furthermore, as pointed out by international relations theorist Jack Snyder, since "constructivists believe that ideas and values helped shape the modern state system, they expect intellectual constructs to be decisive in transforming it — for good or ill."[343]

By way of summary and illustration, consider the remarkable fact that since the first atomic attacks in 1945, which some conclude were highly instrumental in bringing about a quick surrender of Japan, nuclear weapons have never been used again in combat for over seven decades. According to some scholars, this non-use of nuclear weapons "remains the single most important phenomenon of the nuclear age."[344] How would realism, liberal internationalism, and constructivism account for this?

Realists would appeal to such material factors as the overwhelming destructive power of these weapons and to the logic of nuclear deterrence. Though acknowledging elements in the realist explanation, liberal internationalists would appeal to international organizations like the United Nations and the success of such international instruments as the Nuclear Nonproliferation Treaty as well as commercial ties and the spread of democracy. Though sympathetic to these two accounts, constructivists would give prominent roles to changes in the identity of states/agents and their interests as well as the power of norms directly related to these weapons — for example, the norm of nuclear weapon non-use as developed by the constructivist theorist Nina Tannenwald in her 2007 book *The Nuclear Taboo*.

With the above development of international relations theory in hand, it proves illuminating to reexamine Oppenheimer's hope and vision of the 1950s as well as his philosophical outlook. Realist, liberal, and constructivist components and themes are noticeably present in Oppenheimer's thought. Realism is seen by his support for robust deterrence and his call for a limited war fighting capacity with nuclear options. However, his realism is tempered and conditional, and reflects the dangers and limits of the international system in the 1950s.

Most predominant and enduring to his thought is liberal internationalism. Oppenheimer's fundamental role and continuing support for the international control of atomic energy is illustrative here. The

Acheson–Lilienthal proposal with the "great hope" and "great peril" of atomic energy offered what he took to be "a pilot plant for a new type of international cooperation." Even with the rejection of the international control of atomic energy, Oppenheimer held that the arguments in the Acheson–Lilienthal Report are "correct arguments" and that "Some day we will want to come back to this." The Acheson–Lilienthal initiative is symbolic of the possibilities of international cooperation and collective security.

Oppenheimer's latter vision of 1957–59 was multi-faceted, long-term, and more down-to-earth. He stressed the need for a viable public sector and the need for moving philosophy back into the public sphere through thematic discourse. Most important, breaking the "grip" of the nation state was central to his vision. From the perspective of liberal internationalism, this could conceivably be achieved through international organizations and institutions (like NATO and EURATOM), and especially communities "embarked on specialized work." For Oppenheimer, "These communities of the mind are the human counterpart and the basis of the international institutions that the future must hold in store and on them rests … the hope that we will survive this unprecedented period in the history of man."[345]

There are major constructivist elements and themes in Oppenheimer's vision. For one, he advocated a pluralist international communitarianism, and community is the heart of the social construction of identity and interests. Further, for Oppenheimer knowledge is communal with these specialized communities being "true elements of federation" and legitimate and natural objects of loyalty and commitment, that is, these international communities construct identities and interests. Given that their knowledge and specialized work are essential for the functioning of society and the international system, these communities work to "undermine state sovereignty from below"[346] by transforming the identities of states and their interests.

Drawing these points together, *Oppenheimer, though aware and open to realist insights, is first and foremost a liberal internationalist with strong constructivist elements.* Compelled by the nuclear revolution in which he played an integral part, he advocated an Open World based on international cooperation with a corresponding faith in the

power of international organizations, institutions, and specialized communities. Further, like many liberals, Oppenheimer expressed utopian themes and can be viewed as advocating a project, or at least a vision, leading us to a liberal world order and a world without war. Unlike realism, Oppenheimer's philosophical outlook is optimistic, progressive, and founded on community. Though Oppenheimer may be a tragic figure, his philosophical vision is not tragic.

Finally, in his influential 1992 article, "Anarchy Is What States Make of It: The Social Construction of Power Politics," the prominent constructivist theorist Alexander Wendt[cc] argues for "the proponents of strong liberalism and the constructivists … [to] join forces in contributing to a process-oriented international theory" since "Each group has characteristic weaknesses that are complemented by the other's strengths."[347] Strong liberals claim that "international institutions can transform state identities and interests," but for Wendt, constructivism can provide the sociological underpinnings and understanding for these transformations.[348]

For the world of today, Wendt holds that "The significance of states relative to multinational corporations, new social movements, transnationals, and intergovernmental organizations is clearly declining …." But he sides with realists holding that "in the medium run sovereign states will remain the dominant political actors in the international system."[349] In other words, the identities and interests of states are basically fixed and will remain so for some time. Given this, a vision of how to move to a strong liberal order must be constructivist in nature and long-term in narrative. The similarities here to Oppenheimer's overall vision are unmistakable.

In the next section, the focus on Oppenheimer and international relations sharpens and provides more detail as well as additional support. The international functionalism of David Mitrany, a colleague of Oppenheimer's, is examined and seen to have affinities with Oppenheimer's vision.

[cc]Wendt is a "modern constructivist" as distinguished from a "postmodern constructivist." (Phillips, "Constructivism" (ref. 342), p. 64). Also, note that postmodern constructivists are concerned with human emancipation.

David Mitrany and International Functionalism

Though others made significant contributions, Mitrany can reasonably be taken as the originator of the functional approach in international relations theory.[dd] He developed his ideas on functionalism during the 1930s and 1940s, and continued to expound and develop them until his death in 1975. In 1943 during the war, Mitrany published his well-received pamphlet, *A Working Peace System*, which has now become a classic essay. According to Chris Brown, a professor of international relations, "Functionalism is certainly the most important approach to international institutions to have emerged in the twentieth century …."[350] Moreover, Mitrany's work "continues to provide inspiration for those who hope to moderate the effects of state sovereignty in the interests of improving global welfare."[351]

Functionalism. In 1975, shortly before his death, the London School of Economics published a collection of Mitrany's works along with a personal memoir and retrospective/prospective reflections. Paul Taylor of LSE and a former student of Mitrany's contributed the scholarly introduction to this volume from which the following excerpt is taken.

> The major principles of functionalism are that man can be weaned away from his loyalty to the nation state by the experience of fruitful international co-operation; that international organization arranged according to the requirements of the task could increase welfare rewards to individuals beyond the level obtainable within the state; that the rewards would be greater if the organization worked, where necessary, across national frontiers, which very frequently cut into the organization's ideal working area. Individuals and groups could begin to learn the benefits of co-operation and would be increasingly involved in an international co-operative ethos, creating interdependencies, pushing for further integration, undermining the most important bases of the nation state. From small beginnings, in Professor Mitrany's view, the functional approach could eventually

[dd]For historical background and interpretation on Mitrany and functionalism, see David Long, "International Functionalism and the Politics of Forgetting," *International Journal* **XLVIII** (Spring 1993).

> enmesh national governments in a dense network of interlocking co-operative ventures. Furthermore, one important pillar of their authority — the loyalties of citizens — would have been weakened in the development at the popular level of a social-psychological community which stressed superordinate 'co-operative' goals, but which nevertheless posed no apparent threat to the existing cultural attachments of groups and individuals. … Functionalism holds that violence has its roots in the social and economic circumstances of people, and that if we give them a "moderate sufficiency of what they want and ought to have they will keep the peace." Accordingly, functionalism points to the potential contribution of the specialized agencies of the United Nations to the improvement of conditions which otherwise encourage violence. It has less to say about the 'fire-brigade' function of the United Nations — the specific actions needed when the fight has started.[352]

Note that functionalism is not so much a theory of international organizations but really an approach to peace based on what Mirtrany describes as "form follows function."

For Mitrany, "form follows function" directs us to concentrate on what unites us, not on what divides us if we are to move toward international solutions and coordinated action. At this time and for the foreseeable future, this will be located in functional approaches not in political-constitutional approaches (like the League of Nations). The political-constitutional tends to be too undefined, overly legalistic, and motivated mostly by what divides us and hence focused on policing not solving. At best, political-constitutional devices lead to half-measures.

First and foremost, we should focus on specific transnational issues and problems that are directly related to welfare (such as disease control, fighting drug trafficking, coordinating transportations like civil aviation, establishing communication systems like postage). Such undertakings in large measure separate the technical from the political, and hence separate what currently unites us from what currently divides us. Moreover, in *A Working Peace System*, Mitrany maintains that this separability-thesis is complemented by "a cardinal virtue of the functional method — what one might call the virtue of technical

self-determination. The functional *dimensions* … determine themselves. In a like manner the function determines its appropriate *organs.* It also reveals through practice the nature of the action required under the given conditions, in that way the *powers* needed by the respective authority."[353] Additionally, "The functional approach … by linking authority to a specific activity" breaks "away from the traditional link between authority and a definite territory" so characteristic on the modern state.[354] Predictably, technical experts and specialized international agencies have vital roles in Mitrany's functionalism. The functional approach is flexible, pragmatic, and above all experimental; and most of all, it is "a plea for the creation" here and now, not later, of "the elements of an active international society."[355]

With successful functional cooperation there should be "spillover" effects promoting wider and more substantial cooperation in the original domain as well as cooperation in other areas. For Mitrany, "Each of us is in effect a bundle of varied functional loyalties … ."[356] Hence, as state powers, especially related to welfare, shift from the state to functional agencies and organizations, national loyalties fade and most likely transfer to "international society." This "transferabiltiy thesis" will be most clearly exemplified by the technical experts and personnel of the specialized agencies due to "a professional pride and a vested interest in good performance." Such "a detached international civil service" would be "the best insurance against any possible abuse," and its functional service "is more likely than anything else to breed a new conscience in all those concerned with such international activities."[357]

Given that sovereignty is "a bundle of powers," state sovereignty diminishes as the functional order expands. Functionalism is not a frontal assault on sovereignty since it looks "to undermine state sovereignty from below."[358] In the words of Mirtany, "Sovereignty cannot in fact be transferred effectively through a formula [say a constitution], only through a function."[359] In constructivist terms, state identities and interests like those of individuals are transformed and new possibilities emerge. Transition from an international system based on power politics to an international society based on functional order becomes conceivable. For Mitrany, "we must put our faith not in a protected peace but in a working peace."[360] In the end,

the functional approach suggests a path to a new global order of peace and prosperity.

Though insightful and even inspiring, Mitrany's ideas have been criticized. For one, his "separability thesis" that the technical can be separated from the political is certainly limited, perhaps naive. For instance, consider the establishment of international communications in authoritarian states. Also, Mitrany appears overly optimistic about "spillover" effects. Can successful functional cooperation, in say disease control, spearhead significant cooperation in the control of strategic weapons?

Moreover, what really is Mitrany's final vision for the world? He is just not clear and specific here, and even appears contradictory at times. Certainly, his vision does not entail a centralized world government. Perhaps, he is contemplating a political world-federation of diminished states. He does at times say that the "the ultimate goal was federation" and he might even take the functional approach as "the development of federation by instalments."[361] But it must be realized that Mitrary was a harsh and continuing critic of federation. In contrast to a federal system, Mitrany speaks of an international society based on functional order. According to international relations theorists Lucian Ashworth and David Long, "Mitrany's vision of a functionally organized world was one with many overlapping, non-congruent international functional organizations" combined with "a web of overlapping, pluralistic associations of groups and individuals."[362] But, as they point out, such a pluralistic vision is confronted with an immense problem of coordination.

Mitrany's "transferability thesis" is also questionable. The loyalties of citizens to a state are not simply tied to their welfare or instrumental needs being fulfilled by the state. Loyalty is grounded in the emotional or spiritual realm as well. Loyalty is based on a shared history and future, generational connections, and a common culture together with national pride and attachment to a given territory. Can national loyalty really be transferred to a functional or instrumental order?

More troubling, is that national loyalty could be first and foremost linked to the physical protection of the citizenry and hence with national security and military power. Mirtany says of security that "It is in fact a separate function like the others, not something that stands

in stern isolation, overriding all the others."[363] Realists would certainly object here pointing out that security and defense are prerequisites for functional undertakings.

In the 1966 re-publication of Mitrany's *A Working Peace System*, Hans Morgenthau, who was perhaps the most prominent realist during the Cold War, wrote the introduction. For Morgenthau, "Modern technology [e.g., nuclear weapons] has rendered the nation state obsolete as a principle of political organization; for the nation state is no longer able to perform what is the elementary function of any political organization: to protect the lives of its members and their way of life."[364] Somewhat ironically for realistic critics of Mitrany, Morgenthau concludes his introduction saying,

> The only rational reply to the challenge which nationalism presents to the peace and order of the world is the voluntary cooperation of a number of nations with common interests for the purpose of creating supra-national institutions after the model of specialized agencies of the United Nations and of the European Communities. These institutions would gradually take over the functions which the nation state has traditionally preformed but is no longer able to perform today. If nation states acted in accord with the rational requirements of the age, they would strive, as it were, to make themselves superfluous. This is the "functional approach" Professor Mitrany advocates. … It would be rash indeed to try to predict who will win the contest between the old and the new, between nationalism and functionalism. But it is no exaggeration to assert that the outcome of this contest will decide the fate of the world. For nationalism as a principle of political organization is not only obsolete; but in the nuclear age it is also self-destructive. Thus the future of the civilized world is intimately tied to the future of the functional approach to international organization.[365]

By way of synopsis, international relations theorist Cornelia Navari in a 1995 article speaks to the "Mitranian Legacy."

> Mitrany's idea, and his chief legacy, was the conceptualization and systematic exposition of a new form of international political organization. Instead of the spiritual union whose parts were fused by a

> common purpose, as many thought of the League [of Nations], or the constitutional federation whose parts are fused by a legal structure, he articulated the model of an organization proceeding by sector or segment whose parts were fused by the carrying out a task. He also gave to this new form its now recognized name, the functional type of international organization, and he promoted it in those terms.[366]

Oppenheimer and Mitrany. The outlooks and ideas of Oppenheimer and Mitrany are similar and reinforcing. Oppenheimer and Mitrany are both in the liberal internationalist tradition offering pluralistic visions with strong emphasis on international cooperation and international organizations. Plus, neither advocated a centralized world state.

Central to their outlooks is that the nation state is obsolete, and its "grip" must be broken if we are to move forward to peace and prosperity. However, at this time, this cannot be achieved by simple, sweeping means due to the lack of international understanding and trust. Taking a long-term perspective, this must be addressed using concrete, practical steps focused on the technical. This is Mitrany's functional approach and Oppenheimer's international "fraternal communities … embarked on specialized work." Both give crucial roles to experts and specialized agencies.

By way of contrast, Oppenheimer's outlook and ideas are above all communal and cognitive whereas Mitrany's are functional and administrative. Though science has a role for Mitrany, it is crucial for Oppenheimer. Science is not simply a technical and instrumental resource; it is also a key cultural resource for Oppenheimer. Moreover, with the ethos of science being universal, international cooperation is intrinsic to the scientific endeavor not just instrumental as found in the functional endeavors of Mitrany.

The international control of atomic energy plays a fundamental role in Oppenheimer's thought, and is symbolic and illustrative of the possibilities of international cooperation. In his 1966 forward and introduction to the re-publication of *A Working Peace System*, Mitrany stresses that when the atomic bomb was placed on the ballistic missile, we all became "one indivisible community, with inescapably one and

the same fate — either to live or to vanish together."[367] Henceforth, the functional approach becomes an overriding and immediate necessity.

More interestingly, he writes that "There can be no real transfer of sovereignty until defense is entrusted to a common authority … ." which "has now found a first international expression in the Security Council, and still more in the American proposals for the international control of atomic energy."[368] There appears to be an unspoken implication here. Namely, atomic energy is so strongly connected to military power and defense as well as civilian welfare (e.g., nuclear power and nuclear medicine) that the "cardinal virtue of the functional method … the virtue of technical self-determination" could allow us to move beyond the nation state even given the realist's point that security and defense are prerequisites for functional undertakings. As Oppenheimer said in 1945, the development of atomic weapons is both "a great peril" and "a great hope." For him, atomic energy is "a new field, in which just the novelty and the special characteristics of the technical operations should enable one to establish a community of interest which might almost be regarded as a pilot plant for a new type on international collaboration" leading to "a world that is united, and a world in which war will not occur."

In the end, both Mitrany and Oppenheimer seek to undermine state sovereignty from below by means of international efforts which emphasize the technical. Mitrany's case for moving beyond the nation state could be strengthened by combining his instrumental, functional approach with Scientific Internationalism. Further, he should have highlighted science as a culture resource and made a stronger call for the international control of atomic energy. Though Oppenheimer's vision clearly included the functional approaches and specialized agencies of Mitrary, he should have juxtaposed his own thought and vision with Mitrany's functionalism. This would have promoted more understanding and connected his ideas to the work of others.

It should be noted that Mitrany was a professor in the School of Social Sciences at the Institute for Advanced Study when Oppenheimer was its director. In what ways and to what degrees, Mitrany and Oppenheimer influenced each other is difficult to say. It is clear

though that they did have political discussions; and their outlooks and ideas exhibit definite similarities and are certainly reinforcing.[ee]

[ee] Mitrany was appointed a professor in the School of Social Sciences at the Institute for Advanced Study in 1933, and Oppenheimer became its director in 1947. It is perhaps impossible to determine when they first met, but there are two letters in the Mitrany Papers at the London School of Economics which are helpful (LSE's Library collections, MITRANY/64). The first is a three-page, single-spaced note to Oppenheimer dated May 10, 1949. In this note, Mitrary addresses the reasons he did not return to the institute when the war was over. He reviews the background and some of the challenges and frustrations (e.g., bad working relations and insufficient financial support) of his appointment at the institute as well as his affiliation with the multinational corporation Unilever. More than a third of the note is devoted to reviewing his scholarly activities (e.g., publications and study groups) during the past few years. Of particular interest is the following.

> The booklet on "A Working Peace System" has, for something of its kind, had a remarkable circulation. What people think of these essays is not for me to say, but I can say that none of them is merely critical or descriptive — but each tries to break new ground. And whatever one may think of it, my approach has started a school of thought, and my writings are quoted as such in books of readings published since the war (as in that of Prof. Ebenstein, of Princeton, or the recent work of Prof. Morgenthau, of Chicago).

Given this, it is reasonable to assume that by 1949 Oppenheimer was aware of Mitrany's work and his "school of thought."

The second letter is from England and dated January 16, 1958. Mitrany reminds Oppenheimer of their recent discussions in Princeton about the current state of political theory and expresses his concern that "we are passing through something completely new in regard to political organisation." He writes, "in the totalitarian countries, like Russia, there is no 'politics' left. The structure and essential principles for the political system … are regarded there as changeable at will; and the give and take of the political process becomes simply a matter of dictation and management by small ruling groups." Mitrany remarks that he has "an unhappy idea that the trend is the same" in the West though to a lesser degree, and likens his ideas to the views of Reinhold Niebuhr. Moreover, "the Welfare State, with its new devotion to economic and social security," could possibly be as "equally ruthless," as imperially motivated states in the past, to other countries, not by invasion, but by suddenly cutting off imports or exports.

In addition, Mitrany sent Oppenheimer a copy of a current review that he had written of the book *Sovereignty — An Inquiry Into the Public Good* by the French political thinker Bertrand de Jouvenel. The review was included since "it states in a

In the next section, the focus on Oppenheimer and international relations sharpens again. The contemporary notion of "epistemic community" is considered and the role of such communities in international relations is explored.

Oppenheimer and Epistemic Communities

With resemblances found in the work of previous scholars like Ludwig Fleck and his "thought collective" along with Thomas Kuhn and his scientific "paradigm," the technical notion of "epistemic community" was "first elaborated in the early 1990s" and has served as the core of a research program in international relations supported by empirical findings.[369] As a case in point, in 1992, the journal *International Organization* had a special issue entitled "Knowledge, Power, and International Policy Coordination" dedicated to the subject of epistemic communities. Edited by the international relations theorist

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summary way some of the things we were discussing about the state of political theory." Oppenheimer knew Jourvenel who was also a member of the Congress for Cultural Freedom. In fact, he was one of some twenty intellectuals that participated in the 1959 Basel seminar where Oppenheimer delivered his talk "In the Keeping of Unreason."

In his 1975 "The Making of the Functional Theory: A Memoir," Mitrany writes negatively of Oppenheimer saying: "The other expectation Dr Flexner [founder of the Institute for Advanced Study] cherished was that within such a small and easy community scientists and humanists would tend to bridge the gap of specialization and cross-fertilise each other. That soon proved a vain project. There were individual contacts and friendships, significantly rather among the older generation; but the physicists, a younger group, were absorbed in their own exciting new universe, and even at mealtime used a language that put the rest of us out of bounds. The division became worse when Dr Robert Oppenheimer took over as director, having come from managing the atomic energy project at Los Alamos. He not only encouraged the expansion of his own school beyond what originally was intended … but tended to use the place as a base for his own activities, more public than scientific; and he also upset the quiet discretion of the Institute's inner life by encouraging a publicity of which he himself seemed to be in need." (Mitrany, *Functional Theory of Politics* (ref. 352), pp. 29–30).

Peter Haas, it consists of eight research articles in conjunction with an introduction and conclusion.[ff]

Early in his introduction, Haas provides the following characterization of "epistemic community."

> An epistemic community is a network of professionals with recognized expertise and competence in a particular domain and an authoritative claim to policy-relevant knowledge within that domain or issue-area. Although an epistemic community may consist of professionals from a variety of disciplines and backgrounds, they have (1) a shared set of normative and principled beliefs, which provide a value-based rationale for the social action of community members; (2) shared causal beliefs, which are derived from their analysis of practices leading or contributing to a central set of problems in their domain and which then serve as the basis for elucidating the multiple linkages between possible policy actions and desired outcomes; (3) shared notions of validity — that is, intersubjective, internally defined criteria for weighing and validating knowledge in the domain of their expertise; and (4) a common policy enterprise — that is, a set of common practices associated with a set of problems to which their professional competence is directed, presumably out of the conviction that human welfare will be enhanced as a consequence.[370]

Though epistemic communities are in many instances scientific communities or networks, they are not restricted to such communities let alone to natural scientists. For example, there can be a human rights epistemic community consisting in part of lawyers and political

[ff]The literature on epistemic communities is extensive. For a recent overview and assessment of epistemic communities, see M. K. Davis Cross, "Rethinking Epistemic Communities Twenty Years Later," *Review of International Studies* (2013), pp. 137–160. For detailed accounts of the emergence and role of epistemic communities in Argentine-Brazilian cooperative nuclear agreements which led to their signing the Nuclear Nonproliferation Treaty as well as the denuclearization of Belarus, Kazakhstan, and Ukraine after the break-up of the Soviet Union, see Sara Z. Kutchesfahani, *Politics and the Bomb: The Role of Experts in the Creation of Cooperative Nuclear Non-Proliferation Agreements* (New York: Routledge, 2014).

scientists. Also, epistemic communities are not professions or disciplines let alone interest groups like environmentalists. In fact, many epistemic communities cut across professions and disciplines. By way of illustration, three cases considered in Haas's edited volume are the arms control epistemic community during the Cold War, the cetology epistemic community and whaling management during the Twentieth Century, and the Keynesian-economics epistemic community and its role in shaping post-World War II policies.

The world of today and the last century is characterized by high levels of complexity and uncertainty as well as rapid technological change. With the dramatic rise of science and rationalization, much of the recent past "can be described in terms of the transfer of wider and wider areas of public policy from politics to expertise."[371] Epistemic communities serve as principal agents in this environment by "articulating the cause-and-effect relationships of complex problems, helping states identify their interests, framing the issues for collective debate, proposing specific policies, and identifying salient points for negotiation." This "control over knowledge and information is an important dimension of power and that the diffusion of new ideas and information can lead to new patterns of behavior and prove to be an important determinant" in such areas as policy innovation and international policy coordination.[372]

The power and prestige of epistemic communities rest on their claim to validated and relevant knowledge, and are enhanced by the solidarity of the communities. Epistemic communities are especially called upon during times of crisis or technological shock (e.g., Sputnik) where decision makers are placed in unfamiliar technological situations calling for action. The power and influence of epistemic communities are amplified by their transnational reach and by their being embedded in advisory and regulatory agencies at the national and international levels. Furthermore, epistemic communities have lasting effects through the institutions and organizations which they played a role in promoting and founding. Most important, the impacts of epistemic communities are not limited to such things as simply supplying information and causal understanding. Epistemic communities share "normative and principled beliefs"

which shape their guidance and counsel along with their actions. For example, they have a commitment to procedural rationality and typically a commitment to human welfare and collective betterment. Consequently, epistemic communities shape the identities of states and the values of decision makers, and extend the horizons of possibility and imagination.

For some, the prominence of epistemic communities is troubling. As they point out, "the increasing influence of specialized groups such as epistemic communities may have serious negative implications for such deep-seated political values as democracy and participation."[373] Nonetheless, "whether they constitute a neutral agent or a politically biased group of experts," defenders of epistemic communities "argue that, normatively, epistemic communities ultimately provide more impartial advice than other modes of policy advice." Further, and more important, "they are worth studying because they represent a causal pathway by which ideas come to inform political practices."[374]

Peter Haas along with Emanuel Adler end their edited volume on epistemic communities with the following, which can be viewed as a tentative hope and vision.

> In the absence or aftermath of a hegemonically created world order, an alternative order based on shared cause-and-effect understandings, practices, and expectations may be possible. While epistemic communities can help constitute such an order, whether or not that order will be a better international order depends largely on the extent to which it is also based on shared values, rather than individual state interests, and on moral vision. Among the necessary conditions for minimal progressive change in international relations are the redefinition of values and reconciliation of national interests with human interests in general, such as security, welfare, and human rights. To the extent that epistemic communities make some of the world problems more amenable to human reason and intervention, they can curb some of the international system's anarchic tendencies, temper some of the excesses of a purely state-centric order, and perhaps even help bring about a better international order.[375]

In short, epistemic communities are important actors in international relations and potentially form a substantial force for progressive change; and investigating them is indispensable for understanding the role of reason and ideas in international relations.

With the above in mind, one sees definite parallels and resonances between these recent investigations of epistemic communities and Oppenheimer's views. Like proponents of epistemic communities, Oppenheimer places strong emphasis on complexity and rapid technological change, and the resulting need for specialized knowledge and understanding. Likewise, Oppenheimer makes a strong connection between specialized communities and knowledge. He portrays this as a kind of "cognitive syndicalism" that is also value-laden (e.g., openness, epistemic honesty, concern for collective betterment). His call for "the fraternal communities of men embarked on specialized work" sounds identical to a call for epistemic communities. Like Adler and Haas above, Oppenheimer held that these communities are a force for progressive change and needed to break the "grip" of the nation state.

Oppenheimer's views on epistemic-like communities are not as well-developed and empirically grounded as discussions of such communities today. This is not surprising since he spoke in the 1950s and not in the 1990s when the technical notion of "epistemic community" was first elaborated. Nonetheless, from firsthand experience, Oppenheimer was certainly cognizant of the power and influence of specialized communities and experts on national and international policy. His experiences as an adviser for atomic weapons during the war and his chairmanship of the General Advisory Committee to the Atomic Energy Commission were surely formative of his ideas. Furthermore, the Acheson–Lilienthal proposal in which he played an instrumental role did become the basis for the American proposal for the international control of atomic energy, and could be regarded as the creation of an epistemic-like community. This community and its proposal were successful at the national level but not at the international level. Nonetheless, the Acheson–Lilienthal proposal (along with the American call for international control) has "left a legacy" that has not been "overlooked" and in altered forms has its

proponents even today.[376] Also, the unsuccessful opposition in 1949 of Oppenheimer along with the General Advisory Committee to the development of the hydrogen bomb is revealing of both the power and limits of epistemic communities.

As we draw this chapter to a close, remember that though Oppenheimer was aware and open to realist insights, he was a liberal internationalist with strong constructivist elements. Like many liberals, Oppenheimer expressed utopian themes and can be viewed as advocating a project, or at least a vision, leading us to a liberal world order and possibly a world without war. Further, with his strong emphasis on the technical and communities embarked on specialized work, his views have definite similarities with the views of advocates of epistemic communities as well as Mitrany and his international functionalism. Like them, Oppenheimer sought to "undermine state sovereignty from below," by transforming the identities and interests of states as well as individuals.

In the next chapter, the examination of Oppenheimer and international relations theory continues by turning to the nuclear revolution and unparalleled ramifications it continues to have on the international system.

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Chapter 10

Oppenheimer and the Nuclear Revolution

In 1946, the Acheson–Lilienthal initiative called for a world without nuclear weapons, and Oppenheimer's later hope and vision of the 1950s held out the prospect for such a world. However, with the failure of the international control of atomic energy in the late 1940s and the deepening of the Cold War together with the proliferation of nuclear weapons, such a world was perceived as utopian and its advocates were dismissed as naive idealists.

Remarkably, during the last few years, the abolition of nuclear weapons is once again being taken seriously. On January 4, 2007, four hard-headed US statesmen — George Schultz (former secretary of defense), William Perry (former secretary of defense), Henry Kissinger (former secretary of state), and Sam Nunn (former chairman of the Senate Armed Services Committee) — published their challenging op-ed "A World Free of Nuclear Weapons" in the *Wall Street Journal*.[gg] Added to this in April 2009, US President Obama in his now famous Prague Speech stated "clearly and with conviction America's commitment to seek the peace and security of a world without nuclear weapons."[377, hh] Later that October, the Nobel

[gg] For an in-depth and fascinating account on these four men along with physicist Sidney Drell, see *The Partnership: Five Cold Warriors and their Quest to Ban the Bomb* by Philip Taubman (New York: HarperCollins, 2012).

[hh] See Des Browne, Shatabhisha Shetty, and Andrew Somerville, "The Importance of Political Leadership in Achieving a World Free of Nuclear Weapons," *International Relations* **24** (2010).

Committee announced that Obama would receive the Nobel Peace Prize saying they "attached special importance to Obama's vision of and work for a world without nuclear weapons."[378] These calls for the abolition of nuclear weapons recommended concrete steps: drastic cuts in nuclear arsenals, strengthening the Nuclear Nonproliferation Treaty, ratification of the Comprehensive Test Ban Treaty by the United States, and better control of the nuclear fuel cycle.

Why these recent calls for abolition of nuclear weapons? For one, the end of the Cold War had opened new possibilities on the nuclear front. Moreover, there was the fear of an outbreak of further nuclear proliferation — a nuclear tipping point — and the frightening likelihood of nuclear terrorism if nothing is done.

In this chapter, the appreciation and significance of Oppenheimer's hope and vision are developed along three avenues. First, the Nuclear Nonproliferation Treaty is examined. Then on the basis of the path-breaking book *Abolishing Nuclear Weapons* by John Perkovich and James Acton, the possibility of nuclear disarmament is explored. Third, the theoretically bold Nuclear One Worldism of Daniel Deudney is presented. With the convergence of these avenues, Oppenheimer's overall vision of constraining and possibly transcending the nuclear revolution exhibits an awareness and significance that was not fully appreciated during his time, and indicates something of value beyond the symbolic that has direct relevance for the world of today. For instance, the connection between Perkovich's and Acton's work and Oppenheimer is straightforward since the prospect of nuclear disarmament is central to the Acheson–Lilienthal proposal as well as Oppenheimer's later hope and vision. Moreover, the Nuclear Nonproliferation Treaty and parts of its regime like the International Atomic Energy Agency have striking similarities to the Acheson–Lilienthal initiative which was pivotal in Oppenheimer's thinking. Further, Deudney's Nuclear One Worldism is in some ways "the great grandson" of the Acheson–Lilienthal plan.

Nuclear Nonproliferation Treaty

The Nuclear Nonproliferation Treaty (NPT) is the primary institution of today's international nuclear order. The treaty was "opened for

signature in 1968, [one year after Oppenheimer's death] and entered into force in 1970 after ratification by three depositary governments (UK, US and USSR) and 40 other countries."[379] Today 190 states-parties have signed the NPT. Only four states have not signed — India, Israel, Pakistan, and South Sudan. North Korea signed but has withdrawn from the NPT. These states except for South Sudan, which became independent in 2011 and in all likelihood will sign the treaty, possess nuclear weapons though Israel has not declared itself in possession of such weapons. The original duration of the NPT was 25 years with review conferences every five years. At the 1995 review conference, the treaty was extended indefinitely. The NPT is the most universal treaty on arms control and nuclear disarmament.[380] According to William Walker, it is "the grand political and normative settlement of the nuclear age."[381]

The NPT is constructed on three pillars — nonproliferation of nuclear weapons, peaceful use of nuclear energy, and disarmament.[382] Central to its structure is the division of states into nuclear weapons states (NWS) and non-nuclear weapons states (NNWS). This division between the signatory states results in an asymmetry in treaty rights and obligations between the NWS and NNWS. For the purposes of the treaty, there are only five NWS — United States, Soviet Union (now Russia), United Kingdom, France, and China. According to the treaty, "a nuclear-weapon State is one which has manufactured and exploded a nuclear weapon or other nuclear explosive device prior to 1 January 1967." Consequently India, Israel, Pakistan, and North Korea cannot join the NPT as a NWS. India conducted its first (peaceful) nuclear explosion in 1974 followed by further nuclear explosions in May 1998. About two weeks later, Pakistan conducted two nuclear explosions. North Korea conducted its first nuclear explosion in 2006 followed by two others in 2009 and 2013. In all probability, Israel has not conducted a nuclear explosion.

Proliferation of nuclear weapons is held to "seriously enhance the danger of nuclear war."[ii] Accordingly, with respect to the

[ii] Some international relations experts, who might be labeled as "proliferation optimists," do not agree with this statement. For the classic debate, see Scott D. Sagan and Kenneth N. Waltz, *The Spread of Nuclear Weapons: A Debate* (New York: Norton & Co., 1995).

nonproliferation pillar, Article I of the NPT requires each NWS "not to transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly, or indirectly" as well as "not in any way to assist, encourage, or induce" any NNWS "to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices." Article II of the treaty requires each NNWS "not to receive the transfer … of nuclear weapons or other nuclear explosive devices or of control over such weapons or explosive devices directly, or indirectly" as well as "not to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices." Furthermore, according to Article III, each NNWS accepts "safeguards, as set forth in an agreement … with the International Atomic Energy Agency [IAEA] … , for the exclusive purpose of verification of the fulfillment of its obligations assumed under this Treaty with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices."

With respect to the peaceful-use pillar, Article IV asserts that "Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with Articles I and II of this Treaty." Furthermore, all parties to the treaty shall cooperate "to the further development of the applications of nuclear energy for peaceful purposes, especially in the territories of non-nuclear-weapon States …, with due consideration for the needs of the developing area of the world." In addition, Article V guarantees that the "potential benefits from any peaceful applications of nuclear explosions" [e.g., mining, making canals] will be made available to any NNWS at a cost "as low as possible and exclude any charge for research and development."

The title of Waltz's opening piece is "More May Be Better" and Sagan's is "More Will Be Worse." On realist grounds, Waltz argues that "the gradual spread of nuclear weapons is better than either no spread or rapid spread" because of such things as stability through nuclear deterrence especially for states having small nuclear forces (p. 42).

With respect to the disarmament pillar, Article VI of the treaty states that "Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to the cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control." The remaining articles of the treaty cover the amendment process of the treaty, the process for states to withdraw from the treaty, the five-year review conferences, and the guarantee that the treaty does not in any way hinder the establishment of nuclear-weapon-free-zones by regional treaties.

The NPT is essentially a "grand bargain" between the NNWS and the NWS. For the sake of a secure world, the NNWS would not obtain nuclear weapons and the NWS would eliminate their nuclear weapons. Not surprising, NWS typically emphasize the importance of nuclear nonproliferation whereas the NNWS typically emphasize nuclear disarmament.

In fact, this was displayed in the negotiating history of the NPT. In the 1960s, the two nuclear superpowers, US and USSR, found mutual strategic interest in advancing nuclear nonproliferation not only in general but also in particular. The USSR was frightened about (West) Germany, its archenemy in two world wars, obtaining nuclear weapons. Added to this, the US was worried about nuclear proliferation amongst the non-aligned states of the Cold War. Most unsettling, India could go nuclear given that China had just become a nuclear weapons state in 1964. This could cause nuclear instability in southern Asia and possibly bring about a nuclear arms race in Asia.[383]

The US and USSR formulated a treaty draft with only the nonproliferation pillar — hence the name of the treaty. The NNWS rejected this and demanded both substantial and procedural amendments. Namely, the substantial amendments were "the unimpeded right to develop all aspects of peaceful nuclear use and to receive related cooperation," a nuclear disarmament obligation for the NWS, and "the recognition of nuclear weapon-free zones." Procedural amendments covered review conferences, a limited 25-year duration of the treaty unless extended by a conference, and "the right of parties to withdraw from the NPT."[384]

The asymmetry between NWS and NNWS and the resulting tension are inherent in the NPT, and potentially destructive of the treaty itself.[jj] On the other hand, this tension is in many ways a creative tension. Given the treaty, the NWS obviously have obtained a negotiated means for opposing and prohibiting nuclear proliferation of other states. But more creatively, even with their lack of a nuclear-weapons threat, the NNWS have a means for moving the NWS toward arms control and nuclear disarmament using diplomatic pressures within a negotiated treaty in conjunction with the threat of withdrawal from the treaty. Further, "The disarmament obligation opened the (long-term) perspective that inequality [asymmetry between NWS and NNWS] would end at some point in the future, not by every state procuring nuclear weapons, but by the present possessors eliminating them."[385]

There are also creative tensions between the pillars and articles of the treaty itself. For example, Article III with the "inalienable right" to peaceful use allows for a NNWS to develop uranium enrichment facilities. Of the fourteen states that currently enrich uranium, six are NNWS (namely, Argentina, Brazil, Germany, Iran, Japan, and the Netherlands).[386] For nuclear power reactors today, enrichment levels typically range from 3% to 5%. But enrichment technology (gas centrifuges today and possibly laser enrichment tomorrow) to reach these low levels can be used to increase levels to say 80% or 90% which are sufficient to then "easily" construct a nuclear weapon. Hence, enrichment involves a dangerous dual-use technology. Furthermore, given that enrichment is the most difficult part in making nuclear weapons based on uranium, like the atomic bomb used in the Hiroshima attack, there is the real possibility that a NNWS can virtually become a nuclear weapons state under the guise of peaceful use. And then if desired, it can quickly move (say in weeks or months) to possess nuclear weapons.

[jj]For an up-to-date and illuminating discussion of the NPT and its associated regime, see *Ethics & International Affairs* **27** (Fall 2013). In this issue, there is a special "Roundtable: Nonproliferation in the 21st Century" consisting of four articles as well as a feature article on the Nonproliferation Complex.

To counter this, there are of course safeguard inspections by the IAEA. But they may prove insufficient if the NNWS is determined to possess nuclear weapons, which could be the case with Iran without successful negotiations. Of course, this calls for stronger and more intrusive safeguards. But more creatively, this may necessitate that enrichment facilities under the national control of NNWS move to multinational or even international control.[kk] This puts pressures and possible constraints on NNWS. However, if a NWS like the US is not making sufficient progress on nuclear disarmament from the perspective of the NNWS, the NNWS can simply reject or drag their feet with respect to multinational/international control of enrichment facilities and even with respect to stronger and more intrusive safeguards. To a large degree this is the situation today. Hence, the peaceful use pillar together with the nonproliferation pillar can creatively push on the disarmament pillar to move forward.

In addition, the peaceful use pillar can support the nonproliferation pillar by encouraging the development of civilian nuclear power in NNWS. By developing nuclear power, civilian bureaucracies are established with "increased incentives to maintain strong ties to the global nuclear power industry, to international capital and technology markets, and to global regulatory agencies — and hence may be more likely to cooperate with the nuclear nonproliferation regime," and even to oppose military and political moves toward nuclear weapons.[387]

Though the NPT is primary to the international nuclear order, understanding what is called the nuclear nonproliferation regime in international relations involves more than understanding the NPT. The nuclear nonproliferation regime is "an interlocking network of multilateral and bilateral agreements, structures, and relationships, all supported by the NPT." Among its important components is the

[kk] Mohamed ElBaradei, former Director General of the IAEA and winner of the Nobel Peace Prize for 2005 along with the IAEA, strongly recommends multinational control of the nuclear fuel cycle. See his "Towards a Safer World," in *The Economist* (October 16, 2003) and an interview of him by Giovanni Verlini, "An Extraordinary Experience," *IAEA Bulletin* **51**, (September 2009). For recommendations related to the international control of the nuclear fuel cycle, see Scott Sagan, "Good Faith" (ref. 409) and "Shared Responsibilities" (ref. 389).

IAEA which was founded in 1957 and whose duties include conducting "audits and inspections (known collectively as 'safeguards') to verify compliance with the NPT."[388] The IAEA is not an enforcement agency and reports NPT violations to the National Security Council and General Assembly of the UN for appropriate action (e.g., sanctions) — "as it did in 2004 with respect to Libya and in 2006 with respect to Iran."[389] The IAEA also works to foster the development of the peaceful uses of nuclear energy and nuclear safety.[ll]

Added to this are "the Comprehensive Test Ban Treaty (CTBT), adopted by the UN General Assembly in 1996" and "supplier control mechanisms (two informal, voluntary coalitions, the Zangger Coalition and the Nuclear Suppliers Group) that control the export of equipment and the materials potentially useful in a nuclear weapons program."[390] Also, there are nuclear-weapon-free zones (NWFZ) where countries in a specified region "commit themselves not to manufacture, acquire, test, or possess nuclear weapons. Five such zones exist today, with four spanning the entire Southern Hemisphere."[391,mm]

Finally, numerous research and educational institutions support the nuclear nonproliferation regime. For instance, the James Martin Center for Nonproliferation Studies, which was established in 1989, is "the largest nongovernmental organization in the United States

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[ll]For an in-depth and insightful account of the IAEA, see Robert L. Brown, *Nuclear Authority: The IAEA and the Absolute Weapon* (Washington, DC: Georgetown University Press, 2015). Though the IAEA was once dismissed as ineffectual, Brown develops a strong case that the IAEA "has in the past twenty years emerged as a powerful international organization" and "has acquired a surprising amount of power over states" in such areas as nuclear security. In large part, this is based on the IAEA providing "politically neutral expertise that produces beneficial policy outcomes." The connections here to Oppenheimer's hope and vision are apparent — nuclear energy/weapons as a universal problem which should enable the establishment of an international "community of interest" centered on the technical, the "renunciation of national sovereignty" in the field of nuclear energy, the solution of the problems presented by nuclear weapons serving as a "pilot plant" for other international organizations, and specialized (epistemic) communities as progressive forces.

[mm]The zones are Latin America (1967 Treaty of Tlatelolco), the South Pacific (1985 Treaty of Rarotonga), Southeast Asia (1995 Treaty of Bangkok), Africa (1996 Treaty of Pelindaba) and Central Asia (2006 Treaty of Semipalatinsk).

devoted exclusively to research and training on nonproliferation studies."[392] With supporting offices in Washington and Vienna, its headquarters is located in Monterey, California; and it publishes the highly-regarded journal *The Nonproliferation Review*.

Unfortunately, the NPT along with the nonproliferation regime have suffered major failures and setbacks. For instance, India, Pakistan, and Israel did not join the NPT and now possess nuclear weapons. In addition, North Korea withdrew from the NPT and conducted nuclear tests. Perhaps more disturbing was "the realization after the Gulf War in 1991 that Iraq [a party to the NPT] had been developing a nuclear weapons program that was not detected by the IAEA."[393] Equally disturbing was the exposure of A. Q. Khan's illicit supply network in 2004 which included export of enrichment technology and nuclear weapon designs. This clandestine network involved operations in such countries as Pakistan, Iran, Libya, North Korea, Malaysia, South Africa, and even Switzerland.[nn]

Moreover, the Comprehensive Test Ban Treaty has not entered into force due to lack of support from key countries. Of particular disappointment was the failure of the US Senate to ratify the treaty in 1999, resulting in dismay around the world, even though the US had signed the treaty and it was "strongly promoted abroad by the Clinton administration."[394] Lastly, even though there have been significant reductions in the nuclear arsenals of the US and Russia, there remain the continuing disappointment of too little progress and the suspicion that the commitments of the US and Russia to disarm are not genuine.

However, the nuclear nonproliferation regime and the NPT have had their successes and highpoints. There was the collapse of the Soviet Union (a NWS in the NPT) into a number of successor states. Only one of these successor states (i.e., Russia) became a NWS in the NPT and the other states, some of which possessed nuclear weapons on their territories but gave them up, joined the NPT as NNWS.

[nn] For an in-depth account of A. Q. Khan and his supply network, see David Albright, *Peddling Peril: How the Secret Nuclear Trade Arms America's Enemies* (New York: Free Press, 2010).

Further, there was the 1995 review conference that extended indefinitely the NPT. This was by no means an assured outcome. The indefinite extension was opposed by many countries, in particular, several Arab countries led by Egypt. Interestingly, compromise was reached to indefinitely extend the treaty by placing on the NPT agenda the proposal for a NWFZ in the Middle East.

Plus, the CTBT has had its successes. Over 180 states have signed the treaty and over 160 states have ratified it. Also, even though it has not entered into force, the spirit of the CTBT with a moratorium on nuclear testing has nearly been universal over the last two decades. Since the beginning of the nuclear testing in 1945, there have been over 2000 nuclear tests. However, during the last decade, only North Korea has conducted nuclear tests (three small tests). Russia ceased testing in 1990, the United Kingdom in 1991, and the United States in 1992. France and China both ceased testing in 1996, and India and Pakistan ceased in 1998.

Equally important, even though not in force, the CTBT has a formal organization called the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) which "was set up in 1996 with its headquarters in Vienna, Austria."[395] Most notable, the main tasks of the CTBTO are the promotion of the treaty and "building up the verification regime" so that it is operational when the treaty enters into force. The verification regime "is designed to detect any nuclear explosion conducted on Earth — underground, underwater or in the atmosphere" and consists of three key components — the International Monitoring System (IMS), on-site inspections, and the International Data Center (IDC). When complete, the IMS will consist of over 300 monitoring stations operating in 89 countries, and currently around 85% are already up and running. Though on-site inspections can only occur once the CTBT enters in force, there was a large on-site inspection exercise carried out in Kazakhstan in 2008. Finally, the IDC gathers data from the monitoring stations, processes it, and distributes it to member states. For instance, when North Korea conducted its three tests, member states "received information about the location, magnitude, time and depth of the tests within two hours — and before the actual test had been announced by North Korea."

In 1963, President Kennedy predicted that "there might be as many as 'fifteen, twenty, or twenty-five nuclear weapons powers' in the 1970s."[396] In 1970, when the NPT entered into force, there were five nuclear weapons powers, and today there are only nine. This is somewhat surprising given "the large number of nuclear weapons-capable states [like Canada, Japan, Sweden, and Brazil], now generally estimated to be around 50."[397] So perhaps, the greatest success of the NPT and its associated regime is simply its contribution to reducing, slowing, and nearly halting nuclear proliferation.

With the above discussion of the NPT in mind, one realizes that the NPT and parts of its regime like the IAEA have definite similarities to the Acheson–Lilienthal proposal which played a vital role in Oppenheimer's thought. Both emphasize the peaceful use and development of nuclear energy while using international safeguards for preventing dangerous activities and uses that could lead to nuclear weapons. Furthermore, the goal of each is a world free of nuclear weapons.

However, differences between them remain. For example, the Acheson–Lilienthal proposal places uranium enrichment under international control whereas the NPT allows these activities to be under national control. In reply to such differences, the NPT should not be regarded "as a static instrument of disciplinary confinement" but rather as "a dynamic instrument of cooperative engagement and innovation in arms control and disarmament."[398] Indeed, the NPT and its associated regime could well be evolving towards an Acheson–Lilienthal-like regime, especially given recent calls for the multinational/international control of uranium enrichment facilities.

Moving to a world free of nuclear weapons is predominant for both the NPT and the Acheson–Lilienthal initiative. Consequently, nuclear disarmament and hence its possibility are central to any assessment or even discussion of the NPT and Oppenheimer's hope and vision.

Nuclear Disarmament — George Perkovich and James Acton

The subject of nuclear disarmament is vast, complicated, and in some respects overwhelming. Given such challenges along with suspicions of idealistic thinking, discussions of nuclear disarmament have been

dismissed at best as forums for political maneuvering and moral posturing, and at worst as forums of confusion leading to perilous actions.

In contrast, during the last few years, nuclear disarmament has been a subject for serious and thought-provoking discussions by international relations scholars and nuclear policy experts. Most important is the work of George Perkovich and James Acton. In 2008, they published their path-breaking paper *Abolishing Nuclear Weapons.* The following year, the edited book *Abolishing Nuclear Weapons: A Debate* was published which consisted of their original paper plus seventeen response papers and concluded with their follow-up response "What's Next?".

Both Perkovich and Acton are with the Carnegie Endowment for International Peace. Perkovich is vice president for studies at Carnegie and Acton is co-director of the Nuclear Policy Program at Carnegie. Both are experts with hands-on experience in nuclear policy with Perkovich trained in US foreign policy and Acton trained in physics. The authors of the response papers are also experts on nuclear issues coming from ten countries. Though not uncritical, the response papers are generally highly favorable toward the original paper by Perkovich and Acton taking it as "seminal," "a conceptual breakthrough," and "the most comprehensive and well-thought-out paper on nuclear abolition I have read" as well as a paper where "the study of nuclear disarmament reaches a new maturity."

The discussion in this section focuses on *Abolishing Nuclear Weapons: A Debate*. After some general remarks about the book and its major findings and recommendations, three problematic areas for nuclear disarmament are highlighted — deterrence at low numbers, the nuclear fuel cycle, and virtual arsenals and nuclear hedging.

To begin, the book by Perkovich and Acton is highly informative, balanced, manageable in length and presentation, politically and technically grounded, and persuasive in much of its argumentation. The authors present strong reasons based on security, legality, and morality for abolishing nuclear weapons along with key recommendations for moving ahead. However, the heart of the work is whether nuclear disarmament is actually a realistic possibility given the world of today. The upshot of their book is that nuclear disarmament is a realistic

possibility and "a good organizing principle for interstate relations," and hence should be taken as a working and regulative agenda for the international order.[399]

One consensus of the two authors and responders that emerges is that "world government need not be invoked in considerations of abolishing nuclear weapons." More specifically, "Nuclear abolition is not an alternative to international politics and power balancing. Rather, it can be a realistic organizing principle of states seeking to balance and order their relations in ways that remove the singular threats of nuclear mass destruction."[400] To make progress, though, there must be cordial relations among major powers, and in some ways, a "concert" among the great powers. Also, the United States and Russia will have to take the lead given their large nuclear stockpiles (currently approximately 8,000 warheads each with previous highs of 32,000 and 45,000 respectively).[401]

In addition, other states (e.g., China with approximately 250 warheads) must assist especially when the arsenals of the US and Russia are lowered to around 500 or 1000 warheads. Further, there must be "joint, simultaneous steps on nuclear disarmament and nonproliferation" and hence the cooperation and participation of most states will be required.[402] Absent this, nuclear-weapon states will not go to a very low number of weapons since without significant progress in ensuring nuclear nonproliferation there arises the real danger of the emergence of new nuclear powers. Equally, non-nuclear weapons states will not cooperate without progress on disarmament. Finally, given a world free of nuclear weapons, another theme emerges, namely, that "verification is important but ultimately not as vital as political-security dynamics and enforcement."[403]

At this point, it might be helpful to highlight some problematic issues for nuclear disarmament according to Perkovich and Acton. First, there is the question of the having a credible nuclear deterrence during the disarmament process when nuclear arsenals of US and Russia reach low numbers like 500 or 1000 warheads. Given such low numbers for the US and Russia, there is the added worry that a smaller nuclear power like China might attempt to sprint to parity with the US and Russia by quickly building up its nuclear arsenal.

Crucial for Russia is the survivability of its nuclear force against a pre-emptive first strike by the US. It has been argued that a small Russian nuclear force is especially vulnerable due to the large US advantage with respect to long-range conventional munitions that can attack nuclear weapons as well as the future possibility of an effective US missile defense. These in conjunction with even a low number of US nuclear weapons might undermine Russian deterrence at low numbers. Hence, crisis instability looms during disarmament since Russia could be tempted to strike first given its vulnerability. However, for Perkovich and Acton, such vulnerability is probably overblown and Russia can certainly develop countermeasures. For example, "Russia currently has about 170 road-mobile ICBMs [intercontinental ballistic missiles] that could hit the United States and it is building more."[404] Such missiles are highly survivable. Furthermore, the effectiveness of missile defense is highly questionable.

The survivability of a small US nuclear force against a first strike is not a significant concern due in large part to its highly survivable submarine-launched ICBMs. However, a small US nuclear force might undermine the extended nuclear deterrence provided to US allies. With the end of the Cold War and the collapse of the USSR, "extended deterrence today is a mission particular to the United States."[405] Undermining extended deterrence is problematic since Japan, for example, might conclude that the US with a small nuclear arsenal would not protect it in a nuclear crisis — for instance with China. Hence, Japan would seek nuclear weapons during the disarmament process and ironically undermine the transition to a world free of nuclear weapons.[oo]

[oo] In his 2011 book *Deterrence During Disarmament* (ref. 401), Acton takes up in detail another argument that deep reductions in the US nuclear arsenal could undermine extended deterrence. During the Cold War, some held that for the extended deterrence to be credible, "the US had to significantly limit the damage it would suffer in a nuclear war on behalf of an ally." Hence, "Large arsenals with significant counter-force capabilities were advocated as a way of achieving this." (p. 41). Acton argues against this on several fronts. For one, in the most plausible cases, the US could not sufficiently limit damage even with a large nuclear arsenal. Second, by appealing to the history of the Berlin Crisis of 1958–62, Acton argues that the

Perkovich and Acton hold that "While these concerns cannot be dismissed out of hand, the risk that counties that now enjoy an extended deterrent would be left vulnerable on the way to abolition must not be exaggerated." For one, the US would certainly involve its allies "in deliberations on the step-by-step processes that could reduce global nuclear arsenals from current levels to zero." Further, there is "conventional-force balancing" and "regional confidence-building" that can address such concerns. In fact, "the prospect of Japanese and/or South Korean nuclear armament may in fact be motivating Chinese cooperation on reducing such insecurities."[406]

Several problematic issues also surround verification mechanisms with regard to dangerous dual-use technologies, especially when the end state of nuclear disarmament (a world free of nuclear weapons) is attained or even approached. As discussed earlier, enrichment technologies of uranium for peaceful use in nuclear power reactors would be such a case. As pointed out by Perkovich and Acton, what many take as weak safeguards with respect to enrichment is "tolerated today in large part because major powers (and others) retain nuclear weapons that are felt to deter both proliferation and nuclear aggression from states cheating on their non-proliferation obligations."[407] Given the end state of nuclear disarmament or its approach, stronger and more intrusive inspections and control would be required than we have today.

For the sake of adequate verification, Perkovich and Acton consider what they call a "radical approach," namely multinational or international control/ownership of enrichment facilities. They recognize that "Moving beyond nationally owned fuel-cycle facilities [especially enrichment facilities] could be a key step towards disarmament, and it is a concept that states should discuss seriously …." They correctly point out that such a transition would be "hugely complicated and politically challenging." Moreover, they caution that

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success of the US in defending its German ally was more a matter of resolve and even "willingness to absorb high costs" rather than a supposedly large arsenal that could limit damage to the US and its allies (p. 51). In the end, Acton holds that "large arsenals contribute little to the effectiveness of deterrence, even extended deterrence." (p. 93).

"There is no precedent for a key facet of a major modern industry being collectively owned by a number of multinational firms, let alone being owned in its entirety by a single international organization." However, given the difficulties of verification and the prerequisite of nuclear equity between states, they suggest that "the most acceptable alternative would be to move towards a standard whereby only multinational facilities were allowed everywhere, notwithstanding the difficulties involved." On a hopeful note, they mention that there are today two such "multinational enrichment organizations — the Urenco consortium and Eurodif."[408]

In his response to Perkovich and Acton, Scott Sagan takes their work as "important because it breaks more new intellectual ground, and digs deeper into the subject [of nuclear disarmament], than any previous study." However, he believes their work is "flawed." For Sagan, "by focusing almost exclusively on the disarmament endgame," they have taken attention away from the NPT of today. Returning to Article VI of the NPT, Sagan reiterates that all member states, not just the NWS, are "committed 'to *pursue negotiations in good faith* on effective measures relating … to nuclear disarmament.'" In particular, Perkovich and Acton fail to place their "important analysis of international control over the nuclear fuel-cycle" in the context of the NPT and the NNWS obligation to negotiate in good faith concerning disarmament.[409] With this in hand and the not unreasonable assumption that the international control of the fuel-cycle is a prerequisite for nuclear disarmament, Sagan, who is "a true believer in the NPT,"[410] calls on the NNWS to fulfill one of their shared responsibilities with the NWS. Namely, begin negotiations about the international control of the fuel-cycle and hence enrichment facilities.

Sagan's analysis is important since it is "a reconceptualization of this issue."[411] Many NNWS will not enter such negotiations since they "fear that any effort to create multinational fuel-cycle facilities … or international facilities … could cut against their 'inalienable right' as specified in Article IV" concerning the peaceful use of nuclear energy.[412] For Sagan, this "inalienable right" has all ways been a "conditional right" due to the requirements of all NPT member states to

be in conformity with Articles I and II. His analysis is novel by making the "inalienable right" to peaceful use similarly conditioned by Article VI on disarmament. Perkovich and Acton take Sagan's suggestions and ideas as "innovative and formidable" and deserving of "further international analysis and discussion."[413]

In fact, Sagan published much of the above analysis along with other ideas in his article "Shared Responsibilities for Nuclear Disarmament" in the Fall 2009 issue of *Daedalus.* This is relevant here since Sagan has been criticized for focusing on the responsibilities of NNWS over the responsibilities of NWS. In his *Daedalus* article, Sagan makes the creative suggestion that even though the NWS are currently exempted from IAEA safeguards, perhaps a NWS like the US should "pick one or more model [enrichment] facilities to place under advanced safeguards, to demonstrate future intentions and help create best practices." By placing such facilities under the international controls of the IAEA, even though not necessary today since a NWS can legally enrich uranium even to weapons-grade levels, the NWS "would signal equitable treatment and a long-term commitment to disarmament."[414] This is highly symbolic since in a world free of nuclear weapons, a former NWS will not be exempted from safeguards and could be required to relinquish national control of enrichment facilities to international control and even ownership. What Sagan is recommending here is what Oppenheimer called "style" in his 1948 talk entitled "The Open Mind." In other words, in pursuing our short-term goals (like nuclear non-proliferation), we must try to demonstrate, or at least hint at, our long-term objectives (nuclear disarmament), especially to other countries like the NNWS.

Enforcement of nuclear prohibition in a world free of nuclear weapons presents numerous problematic issues as well as formidable challenges. As pointed out by Perkovich and Acton, the chief challenge for enforcement in a nuclear-weapons-free world is preventing and, if necessary, responding to a nuclear "break-out" — namely, a state covertly acquiring nuclear weapons which threatens and endangers the status quo. Developing enforcement mechanisms is difficult for many reasons. For example, in preventing break-out through verification, one will be presented with ambiguous evidence concerning

compliance that gives rise to various interpretations and disagreements. Additionally, threat perception of a "break-out" would have a "wide spectrum." For Israel, a "nuclear break-out" by an Arab state "could pose an existential threat" whereas for China because of its size and conventional forces it would not.[415] Furthermore, what international body would decide non-compliance and determine the means of enforcement for non-compliance, let alone for an actual nuclear break-out? Something like the UN Security Council with the veto power of its five permanent members or some other body without members having veto power?

Even given this enforcement maze, Perkovich and Acton manage to make insightful and constructive recommendations and suggestions. For one, to reach consensus, there should not be "robust automatic-enforcement measures against non-compliant actors" and accommodations need to be made for "case-by-case decision-making processes."[416] Also, "to avoid complications associated with Security Council membership, veto rights and so on, leaders of a nuclear-weapons-prohibition effort might propose that the prohibiting treaty or convention establish a separate body to authorize enforcement action."[417] Further, to encourage states to join the prohibiting treaty, there should be a withdrawal option though it would have "very stringent conditions attached."[418]

Though the challenges of enforcement are numerous and may appear overwhelming, there are some strong reasons for optimism. For one, in a nuclear-weapons-free world, "the major powers … would take violations more seriously because small-scale cheating would pose an even greater risk to their security than is the case now."[419] Intriguingly and with some hope, Perkovich and Acton close their chapter on enforcement as follows.

> Any well-informed analyst can cite dozens of obstacles and complications standing in the way of the establishment of means to authorise and implement enforcement that would make states now reliant on nuclear deterrence feel able to relinquish their weapons. Yet it is also possible to take a broader view. Speaking to a conference on nuclear disarmament in Oslo in February 2008, former US Secretary of State George Schultz offered an important rejoinder to

> pessimism on this issue. Few in the early 1980s, he observed, imagined the political changes that would in a few years result in the peaceful end of the Cold War. Similarly, today, we underestimate the potential for developments that would profoundly change the prospects for abolishing nuclear weapons. If, Schultz suggested, a few leaders of nuclear-armed states stepped forward with conviction and determination to seek the prohibition of nuclear weapons, many obstacles that seem immovable today might become movable.[420]

In their next chapter, Perkovich and Acton give some additional mechanisms for enforcement and hence optimism. Of particular interest are the notions of nuclear hedging and virtual arsenals. Nuclear hedging by a state is simply the "retention of a capacity to reverse the renunciation of nuclear weapons" (e.g., maintaining technical personnel as well as some limited nuclear-weapons technology). Such hedging "might be seen as an important element of an enforcement regime, at least for a transitional period."[421] The ability of some states to quickly reconstitute nuclear weapons would serve "to deter or retaliate against break-out." This is essentially the idea of "virtual" nuclear arsenals or "weaponless deterrence" put forward in 1984 by US journalist and nuclear analyst Jonathan Schell. Though controversial, virtual nuclear arsenals "might make the nuclear-armed states more willing to pursue disarmament in the first place" and could be viewed "as simply another step on the road to 'genuine' abolition."[422] Simply put, even in a world free of nuclear weapons, there is still nuclear deterrence.

Abolishing Nuclear Weapons is a path-breaking book in which "the study of nuclear disarmament reaches a new maturity." Its most relevant feature for us is its overall conclusion — nuclear disarmament is a realistic possibility and "a good organizing principle for interstate relations," and hence should be taken as a working and regulative agenda for the international order. The connection to Oppenheimer is straightforward since the prospect of nuclear disarmament is central to the Acheson–Lilienthal proposal for the international control of atomic energy as well as his later hope and vision. As will be seen in the next section, it has a central role in the work of Daniel Deudney as well.

Nuclear One Worldism — Daniel Deudney

In 2007, Daniel Deudney published his well-received book *Bounding Power — Republican Security Theory from the Polis to the Global Village*. Reviewers praised it as "rich," "truly brilliant," "creative and original" as well as "destined to be a classic work" in international relations theory. His book was a co-winner of the 2008 Robert Jervis and Paul Schroeder Best Book Award (International History and Politics Section) given by the American Political Science Association. Deudney, a political scientist and an international relations theorist at Johns Hopkins University, has also served as a consultant and adviser in the US Senate and as a senior researcher for the Worldwatch Institute in Washington, DC.

For our discussion, the essential notion is what Deudney calls "nuclear one worldism" which is the main subject of the penultimate chapter of *Bounding Power*. Nuclear one worldism is not new for Deudney. In fact, it took center stage in his 1995 article "Nuclear Weapons and the Waning of the Real-State" published in *Daedalus*. Indeed, *Bounding Power* can be seen as placing nuclear one worldism in broader historical and theoretical contexts, and consequently bolstering its credentials and its importance as an extrapolation from the past.

Nuclear one worldism is a response to the nuclear revolution that occurred in the 1940s. At the risk of simplification, given that nuclear weapons are globally destructive, a realist interstate anarchy is intolerable and a global solution is called for, namely some form of nuclear one worldism. What is unique and intriguing is that Deudney develops and evaluates nuclear one worldism in the Western tradition of republicanism and, most important, in what he calls "republican security theory." Republicanism is characterized by a number of key norms — political freedom and liberty, popular sovereignty and participation, and limited government with checks and balances. The principal objective of republicanism, which Deudney christens as "negarchy," is to avoid the extremes of anarchy and hierarchy. In other words, negarchy holds that republics are "the simultaneous negations of both anarchy and hierarchy."[423]

Deudney considers various "schools of thought on the implications of nuclear weapons for world order."[424] *Classical nuclear one worldism* — whose golden age, according to Deudney, was during the 1940s, 50s, and even the early 60s — argues for a centralized world state with such institutions as "a worldwide centralized military apparatus capable of coercing all other actors."[425] However, republicanism would reject a centralized world government by appealing to such norms as political liberty and limited government, and holding that extreme interstate anarchy produced by the nuclear revolution has simply been replaced by an extreme global hierarchy.

Another school of thought is *nuclear strategism*, which "holds that the advent of nuclear weapons marks no decisive break in world politics and observes the behavior of states to be largely the same before and after their arrival." This position, which views such initiatives as "interstate arms control as useless and possibly harmful," would be rejected in republican thought since it simply does not address the extreme interstate anarchy produced by the nuclear revolution.[426]

A third school is *institutional deterrence statism*, which emphasizes nuclear deterrence along with institutional supports for enhancing deterrence such as arms control. Deudney also rejects this dominant and influential view by pointing out that though it addresses the extreme anarchy of the nuclear revolution, it is really "a reformist response to a revolutionary situation." The reasons here are at least two-fold. For one, *deterrence statism* assumes that states have "sufficient organizational and technological capacities to sustain stable deterrence." So the danger is not only possession of nuclear weapons by states, but also the danger of "the possession of nuclear weapons by imperfect states."[427] Second, with the shadow of 9/11, there is now the dreadful conception of nuclear terrorism by small groups of non-state actors which undermines the doctrine of state deterrence.

Deudney advocates a school of thought which he labels *federal-republican nuclear one worldism*. According to this school, there is not a centralized world state, but there is republican global governance. In particular, as expressed in his 1995 article, "the state system is augmented (rather than replaced) by a nuclear containment system:

nuclear capability is *separated* from state control and *paralyzed*." Moreover, Deudney holds that "This image of adjustment is implicit in the architecture of the Baruch Plan [and I would contend "its more enlightened predecessor, the Acheson–Lilienthal Plan"[428]] …."[429]

Deudney expresses similar positions in *Bounding Power*, and his book should be regarded as providing some of the much-needed "theoretical critical mass" — especially for the previously mentioned idea of nuclear containment which he calls *strategic neutralization*. For him, this idea or notion "animates the first and in many ways still most significant proposal for nonhierarchical world nuclear governance, the Baruch Plan [and hence the Acheson–Lilienthal Plan]."[430] In his book, Deudney discusses the workings of the Baruch (Acheson–Lilienthal) Plan in some detail.

It is instructive to highlight two additional ideas that he attributes to federal-republican nuclear one worldism — recessed deterrence and unconquerability. Recessed deterrence is just Deudney's name for what was called weaponless deterrence or virtual arsenals in the previous section on nuclear disarmament. Functioning at a different level, "Unconquerability is the notion that it has become very difficult to conquer, occupy, and govern territories occupied by hostile populations" due to the worldwide diffusion of weapons which is symbolized for Duedney by the Soviet Kalashnakov assault rifle.[431] Such has been the experience of the two nuclear weapons giants — the United States in Vietnam and the Soviet Union in Afghanistan.

Given ideas like these that constitute federal-republican nuclear one worldism, the republican objective of avoiding the extremes of anarchy and hierarchy is achievable. Extreme interstate anarchy is countered by strategic neutralization through the international control of atomic energy along with recessed deterrence. Extreme global hierarchy is countered by a system of states with all having at least unconquerability and some even with recessed deterrence.

Even though the end or *telos* of *Bounding Power* emerges as nuclear one worldism, Deudney has more sweeping ambitions. By recovering the lost tradition of republicanism, he undertakes to reconstruct our theoretical past and show that realism and liberalism (and hence liberal internationalism) are huge "fragmentary successors" of

republicanism. Central to this reconstruction is republican security theory and the master variable of "violence interdependence." Now given the intense, large scale violence interdependence brought about by the nuclear age, even continental republics like the United States are no longer viable.[pp] Consequently, a move to some form of federal-republican nuclear one worldism is necessitated.

What's more, from the tradition of republican security theory, Deudney presents a most intriguing reversal.

> Viewing the evolution of this tradition as it has grappled with variations and changes in the spatial scope of different degrees of violence interdependence reveals a rich heritage of having repeatedly done what we are again being compelled to do. If the most basic insight of this tradition, the core of the anarchy-interdependence problematique, is that situations of intense violence interdependence combined with anarchy are intrinsically incompatible with security-from-violence and that government is needed for security in such contexts, then the establishment of world government, of government scaled to the spatial scope of contemporary intense violence interdependence, is not in this most important sense novel. Rather it simply stipulates that we again must do what we have done so many times before.[432]

In short, given the nuclear revolution, a determined effort to achieve nuclear one worldism is not utopian but "simply the continuation of a long familiar pattern."[433] Indeed, federal-republican nuclear

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[pp] As summarized by Charles Kupchan in his review of *Bounding Power*, "Deudney probes the intellectual roots of republican security theory" and "reclaims the importance of material concerns by developing the notion of violence interdependence — a basic measure of the ability of actors [e.g., states] to do physical harm to each other. Geography, topography, transportation and weapons technology, and state size are among the most important variables determining violence interdependence. As violence interdependence has increased, republican polities have had to increase their size to remain viable — from democratic city-state, to constitutional nation-state, to federal republic. Spatial and technological demands have driven institutional innovations — such as the compound republic — that made possible continental federations of the size and scope of the United States." (ref. 437, p. 859).

one worldism would complete the nuclear revolution much like the republican continental state completed the industrial revolution. What would be radically novel, and hence utopian, would be to remain in the extreme interstate anarchy produced by nuclear revolution without devastating results. Somewhat incredibly, Deudney's analysis reverses the presumption of utopianism from world government to such dominant and currently influential positions like institutional deterrence statism.

Moreover, given that realism and liberalism are fragments of republicanism, Deudney takes his reconstruction of our theoretical past as demonstrating that "the current hegemony of Realism [in international relations theory], particularly regarding security, is unwarranted." Consequently, the appeal of realism is diminished "while expanding, deepening, and recentering international Liberalism."[434] For instance, so-called liberal appeals for certain international organizations, and for world government in particular, can be "advanced as necessary to meet basic security (and other) needs, rather than as desirable in order to improve or ameliorate the human condition."[435] In fact, Deudney says republican security theory is in some sense a "first Liberalism" by being "primarily focused on the security-from-violence problem." Further, some of the most powerful ideas in liberal internationalism like "democratic peace, commercial peace, and international unions, are the legacies of Enlightenment republican security theory."[436]

Though Deudney's *Bounding Power* has been highly praised, it has been criticized. The penultimate chapter can appear as "a somewhat esoteric reflection on 'nuclear one worldism.'"[437] Even John Ikenberry, a friend and colleague of Deudney, cautions that "This book is not for the theoretical faint of heart."[438] Irrespective of such criticisms and his "imaginative phrase making," Deudney offers a powerful, and in many ways convincing, analysis of contemporary international relations theory that addresses the present nuclear crisis.

Most significant, Oppenheimer's and Deudney's assessments and outlooks are mutually reinforcing on several dimensions. First, both recognize the revolutionary significance of the nuclear revolution and its destructive technology for the nation state and the international

system. However, they do not call for a centralized world state. Oppenheimer calls for the Acheson–Lilienthal initiative for the international control of atomic energy within a state system where states relinquish their sovereignty in the nuclear field. This is just Deudney's idea of nuclear containment that he calls *strategic neutralization* and relates to the (Acheson–Lilienthal) Baruch Plan. In fact, in concluding a talk at the New America Foundation in July 2007, Deudney refers to his ideas on nuclear containment as "the great grandson of the [Acheson–Lilienthal] Baruch Plan." Interestingly, Oppenheimer is absent from Deudney's account.

Formative and central to Oppenheimer's hope and vision is the Acheson–Lilienthal proposal advocating the international control of atomic energy and its move toward a world free of nuclear weapons. Even with its failure, Oppenheimer told audiences in the 1940s that the ideas and arguments in this proposal are "correct" and "in some ways eternal," and that "Some day we will want to come back to this." As we see today, these ideas and arguments are in many ways instantiated in the Nuclear Nonproliferation Treaty with its three pillars — nonproliferation of nuclear weapons, peaceful use of nuclear energy, and disarmament — and guide its evolving structure. Furthermore, the Acheson–Lilienthal initiative is reflected in Deudney's Nuclear One Worldism. Most important, the work of Perkovich and Acton on nuclear disarmament, along with Deudney's theoretical studies, help to quell objections of utopianism to Oppenheimer's hope and vision by providing a realistic possibility that is historically and theoretically grounded.

In his reply to *Abolishing Nuclear Weapons*, Harald Müller criticizes Perkovich and Acton for not putting enough emphasis on a "macro-argument" based on the "path-dependency" of the process of nuclear disarmament. Müller observes that

> The actors in a disarmament process will change the conditions of the basis on which they act as they go along. The last steps will occur — if and when the path up to then has been successfully walked — in a vastly different environment from the one in which the journey started. Neglecting this social dynamic in the

> disarmament process leads, on the one hand, to overconfidence in predicting or prescribing specifics of the end stage from today's vantage point. On the other hand, it tends to define obstacles for this last phase, which, by the time it arrives, might have gone away.[439]

As noted in Chapter 5, Oppenheimer published an article entitled "International Control of Atomic Energy" in the January 1948 issue of *Foreign Affairs*. With success at the UN in the short term "rather unlikely," he addressed questions of "why in a matter so overwhelmingly important to our interest we have not been successful" and "what lessons this has for our future conduct." In a vein similar to Müller and with a lyrical touch, Oppenheimer concluded his article by writing,

> It is necessarily denied to us in these days to see at what time, to what immediate ends, in what context, and in what manner of world, we may return again to the great issues touched on by the international control of atomic energy. Yet even in the history of recent failure, we may recognize elements that bear more generally on the health of our civilization. We may discern the essential harmony, in a world where science has extended and deepened our understanding of the common sources of power for evil and power for good, of restraining the one and of fostering the other. This is seed we take with us, traveling to a land we cannot see, to plant in new soil.[440]

Surely, part of this seed is the Acheson–Lilienthal proposal along with the potential of international communities "embarked on specialized work" to break the "grip" of the nation state.

Epilogue

During the period from 1957 to 1959, at the height of modernity and the depths of the Cold War, Oppenheimer put forward a hope and vision. Central to Oppenheimer's vision is the humanization of science and breaking the "grip" of the nation state. He emphasized scientific internationalism, the communal nature of science, and science as a cultural resource supporting democracy and offering philosophical insight through such ideas as complementarity. Specialized communities, with scientific communities as exemplary, provide means for "tethering" the Leviathan state, and moving us forward to a world of justice and a world without war and nuclear weapons. In addition, specialization offers personal meaning as well as shelter from mass culture, and generates a bulwark against a dangerous relativism. He worked to prevent social atomism by calling for cultural coherence through dialogue — a kind of conversationalism — and our dual duty of great openness and faithfulness grounded in specialization and community. He recognized "the antinomy between the individual and the community" and attempted to mitigate it. All the while, he avoided both a radical individualism like MacLeish's and a universal scientism like Rabi's.

Pluralism was central to Oppenheimer's views on science and society; and in many ways, Oppenheimer defended what might be called a pluralistic version of "Communicative Realism." Such a view would be based on specialized discourses of communities committed to unambiguous communication, and most important, committed to

epistemic understanding of various parts or aspects of the natural and social worlds, and hence to empirical constraint. A meta-discovery resulting from these communal endeavors is that the world is pluralistic and incapable of a universal discourse. In other words, the domain of knowledge is a kind of "cognitive syndicalism." However, specialized discourses are objective and capable of meaningful coherence through thematic discourse combined with second-order knowledge and understanding grounded in specialization.

Oppenheimer's overall hope and vision arose from his involvement with atomic weapons and attempts at international control, and in all likelihood, personal crises as well. Other sources included the Ethical Culture movement, Hindu thought, and, most important, Bohr and his call for an Open World. In a philosophical light, Oppenheimer's vision can be seen as a response to modernity and its various crises, and having connections with American pragmatism. In an international light, it can be seen as a response to the nuclear revolution, and having connections to liberal internationalism as well as functionalist and constructivist thought.

An overall goal of this book — in part, a venture into "philosophical biography" — was to sympathetically trace and develop the ideas on science and society as well as the nuclear revolution that Oppenheimer presented to the public and his fellow elites. This exploration helps remove some of the mystery surrounding Oppenheimer by illustrating constants or invariants in his life and thought (e.g., liberal internationalism, Acheson–Lilienthal initiative, scientific internationalism, communal view of science, science as a cultural resource, Bohr and complementarity). Most important, a biographical theme focused on responsibility is enriched by elaborating the hope and vision that Oppenheimer presented to the public — a vision for understanding and confronting the nuclear revolution in which he "played an active part."

In addition, scholars and biographers have spoken of Oppenheimer as providing hope and vision. For instance, Silvan Schweber holds that Oppenheimer believed that "he could formulate a new philosophical vision appropriate and relevant for the new times."[441] David Hecht in his 2008 article "The Atomic Hero"

remarks that Oppenheimer's supporters "lauded him for providing a particular kind of hope."[442] Also, Priscilla McMillan claims that "among the scientists who created the bomb there were heroes" who "tried desperately, each in his way, to control the outcome," and that "Oppenheimer was the American who could see the furthest" and "was the most articulate."[443] By investigating Oppenheimer's thought and drawing strong connections to contemporary philosophy and international relations theory, this book has attempted to bring additional depth and insight to such scholarly claims as well as Oppenheimer himself.

For the most part, Oppenheimer is remembered for how he lived, and perhaps also for what he suffered, and not for what he said. He is engulfed by atomic celebrity and represented by such simplifying quotes as "Now I have become death, the destroyer of worlds." However, Oppenheimer was strategically placed, and he had something to say about the modern world and its possibilities that has relevance even today.

Oppenheimer's efforts in presenting his ideas and vision were sustained and wide ranging. Yet, like many other intellectuals and scientists, he never wrote a book that is a systematic exposition of his views. Though a philosophical thinker, Oppenheimer was not part of the continuing philosophical community since he functioned as a public intellectual speaking to audiences of his time. In some ways, this book has been an exercise in philosophical recovery and reconstruction that attempts to place Oppenheimer's thought back into the public forum. It is also a general argument that the views of natural scientists need to be taken seriously as scholarly resources for promoting a viable public sphere and connecting us with our past as well as assisting us in more meaningful philosophical and political investigations.

I have attempted to illustrate this in various ways — placing Oppenheimer's thought into the general discussion of modernity, relating his thought to liberal internationalism/constructivism and Mitrany's international functionalism, showing mutual support between Oppenheimer's analysis of the nuclear revolution and Deudney's nuclear one worldism, furthering Schweber's discussion of

Oppenheimer and American pragmatism, showing connections between Oppenheimer's thought and Stephen Toulmin's 1990 discussion of modernity and the "tethering" of the Leviathan state, and making contact between Oppenheimer's views on science and Harry Collins' call in 2002 for "The Third Wave of Science Studies."

Furthermore, connections between Oppenheimer's thought and the ideas of Richard Rorty and Bernard Williams have proved enlightening. Most interesting, ideas from Williams (e.g., moral dilemmas and moral luck) and Rorty (e.g., destruction of the narrative unity of one's life) have served as useful conceptual tools in discussing and bringing understanding to the challenges and dilemmas that Oppenheimer faced in his life, and again in removing some of the mystery surrounding him. Additionally, these interpretations reflect back on Williams and Rorty and serve to highlight the vitality and relevance of their philosophical views.

It is interesting to note omissions where significant, historical connections could be made. In January 2003, at a forum entitled "National Pride, National Shame" at Stanford University, Rorty called for the United States to make a "gesture toward the future" and "issue a call for diminishing the sovereignty of individual nation-states, including our own." In particular, nations would turn over part of their national sovereignty to an international organization, and all nuclear powers would eliminate their nuclear weapons.[444] Many believe that a nuclear attack/war is perhaps the greatest threat to liberal democracy and its extension, and could give rise to the Orwellian state. Rorty reminded his audience of the "Baruch–Lilienthal" plan for the international control of atomic energy, saying that many in 1945 viewed such a plan as "an obvious necessity." However, this is not so today in the era of the American Empire and the national security state. Rorty told his audience that the United States could receive glory and be viewed with pride if it was the first great empire to work for something greater than its own security and work for the security of the world. Rorty mentioned Roosevelt, Truman, and Einstein but not Oppenheimer. Given that Oppenheimer played a central role in the development of the atomic bomb and was "the most stimulating and creative mind"

among the proponents for the international control of atomic energy, Rorty's omission is telling and reflective of Oppenheimer's absence from the public sphere.[qq]

Oppenheimer and his thought are difficult to categorize using simple labels. Though he was a polarizing figure politically and perhaps personally during his lifetime, his thought and vision are not polarizing. Oppenheimer was not a movement intellectual (e.g., peace movement, environmental movement) or a revolutionary. Being slightly left of center, he was never a symbol for the political left or right.

Further, Oppenheimer was an insider and part of the political establishment (like MacLeish and Rabi) and not an outsider (like Einstein and Linus Pauling). Consequently, if one takes the tradition of the intellectual as being the "outsider," then Oppenheimer appears not to be an intellectual, let alone a public intellectual. For instance, Irving Howe, founder and long-time editor of *Dissent*, might well defend such a position. In 1954, the year of Oppenheimer's security hearing and political exile, Howe published an article, entitled "This Age of Conformity," in *Partisan Review*. Howe claimed that "the truly powerless people are those intellectuals — the new realists — who attach themselves to the seats of power, where they surrender their freedom of expression without gaining any significance as political figures." Consequently, "whenever they become absorbed into the accredited institutions of society they not only lose their traditional rebelliousness but to one extent or another *they cease to function as intellectuals.*"[445] A rejoinder here, as pointed out by the philosopher of science Noretta Koertge, is that though being an insider runs risks of corruption and losing one's "rebelliousness," the "same insider perspective also enables them [scientists] to serve as sentinels for society at large."[446]

[qq]Interestingly, in the January 31, 2003 issue of the *Chronicle of Higher Education*, there is "the text of the speech given by Richard Rorty" at this forum. The published text is structurally the same and the content is essentially same as Rorty's actual speech, but the wording is somewhat different. For example, in the published text, Oppenheimer is referred to along with Einstein when Rorty concludes the published text but not in the actual speech. This omission and then inclusion may be reflective of the historical and scholarly ambiguity surrounding Oppenheimer.

More to the point, one could respond to Howe by appealing to the views of the historian Richard Hofstadter, who wrote in his book, *Anti-Intellectualism in American Life* (winner of the 1964 Pulitzer Prize for Non-Fiction), that:

> The intellectual who has relinquished all thought of association with power understands well — almost too well — that his state of powerlessness is conducive to certain illuminations. What he is prone to forget is that an access to power and an involvement with its problems may provide other illuminations. The critic of power tries to influence the world by affecting public opinion; the associate of power tries directly to make the exercise of power more amenable to the thought of the intellectual community. These functions are not of necessity mutually exclusive or hostile. … The characteristic intellectual failure of the critic of power is a lack of understanding of the limitations under which power is exercised. His characteristic moral failure lies in an excessive concern with his own purity; but purity of a sort is easily had where responsibilities are not assumed.[447]

So for Hofstadter, Oppenheimer's insider status would not disqualify him as an intellectual, let alone a public intellectual.

Even more, like the "critic of power," Oppenheimer tried "to influence the world by affecting public opinion;" and as an "associate of power," he tried "directly to make the exercise of power more amenable to the thought of the intellectual community." Oppenheimer surely believed that these two functions were not merely "mutually exclusive" but really two dimensions of his responsibility. Remember, in his 1966 conversation with Thomas Morgan of *Look Magazine* shortly before his death, Oppenheimer said that responsibility "is almost a secular device for using a religious notion without attaching it to a transcendent being." And he did not know "how to describe [his] life without using some word like 'responsibility' to characterize it, a word that has to do with choice and action and the tension in which choices can be resolved," and noted that meaningful responsibility presupposes power. However, Hofstadter's analysis entails a warning: even though "access to power and an involvement with its problems may provide other illuminations," there is the danger of losing one's moral purity.

Oppenheimer's views and vision have definite ties to the thought of many contemporary scholars as already illustrated by Stephen Toulmin and Harry Collins as well as international relations experts like Scott Sagan and Daniel Deudney. Further, Oppenheimer's communal views have connections with scholars who have successfully moved into the popular media of today. One might think of the political scientist Robert Putnam and his best-selling book *Bowling Alone: The Collapse and Revival of American Community* published in 2000. One might also think of the political philosopher Michael Sandel and his outstanding Reith Lectures *A New Citizenship* delivered in 2009. Sandel's "communitarian self" resonates well with Oppenheimer's ideas on the individual and society. Also, there is his 2012 awarding-winning book (along with his internet presentations) *What Money Can't Buy: The Moral Limits of Markets*? And, of course, there is Sandel's free, online course *Justice: What's the Right Thing to Do?* which has reached thousands, perhaps millions, of people around the world. Both Putnam and Sandel are at Harvard University, and Oppenheimer, as a former overseer, would surely commend them for their contributions to the public sphere. Remember, in 1959 and prescient of Rorty's break with analytic philosophy twenty years later, Oppenheimer criticized the professionalization of philosophy with its overemphasis on certainty and epistemology, and called for it to return to the public sphere of thematic discourse.

In numerous ways, the world of today has moved beyond Oppenheimer and the 1950s. The Soviet Union has collapsed and the Cold War has ended peacefully, and globalization is now the historic force. Technologically, spacecraft have taken us to the moon and probed the surface of Mars while the world is now connected through the Internet. Scientifically, the human genome has been mapped and the so-called "God Particle" has been detected. Politically, the United States has elected a black president and women serve on its Supreme Court.

Academic philosophy of today is much richer than in the 1950s when Oppenheimer was an Overseer at Harvard. Analytic philosophy, though still dominant in the English-speaking universities, has evolved and lost much of its rigidity and is more receptive to other traditions like pragmatism and continental philosophy. Most important, analytic

philosophy has shifted its emphasis from a metaethics of analyzing ethical discourse to actually doing normative ethics. Emblematic of this move to normative ethics is the work of John Rawls (1921–2002), considered the most important political philosopher of the 20th Century, and his defining text, *A Theory of Justice*, published in 1971. Further, philosophers like Bernard Williams have revitalized Aristotelian ethics by focusing on what is now called virtue ethics and communitarian ethics. At another level, philosophical ethics has focused on significant domains of human activity and experience as illustrated by fields such as medical ethics, environmental and climate ethics, and even nuclear ethics.[rr] Such major shifts in academic philosophy have provided us new understanding and insights, and are advancing philosophy to fulfill its proper role of fostering a viable public sphere.

With regard to the nuclear revolution, we have also moved considerably beyond the 1950s. For over 70 years, the international nuclear order has demonstrated a series of successes — no combat use of nuclear weapons, only nine states have nuclear weapons, no nuclear disaster with the break-up of the Soviet Union, no nuclear test explosions by the majors powers for over 15 years, and significant reductions in the nuclear arsenals of the United States and Russia.

Unlike the 1950s, nuclear disarmament is no longer simply dismissed as utopian. A president of the United States has called for and helped us move forward to a world without nuclear weapons. Most important, as stated by the nuclear expert Harald Müller, "The nuclear non-proliferation regime, with the Non-Proliferation Treaty (NPT) at its core, can be called one of the most amazing international institutions."[448] With the NPT and its three pillars (nuclear nonproliferation, peaceful use of nuclear energy, and nuclear disarmament) in place for over 40 years, calls for a world free of nuclear weapons can point to an international institution with a successful history that is serving as a framework to move forward to nuclear disarmament and possibly to a world without war.

[rr]For an excellent source on climate ethics, see Stephen Gardiner, Simon Caney, Dale Jamieson, and Henry Shue (editors), *Climate Ethics: Essential Readings*, (Oxford: Oxford University Press, 2010).

In addition, there is now, and continues to be, significant scholarly work in international relations related to nuclear disarmament as illustrated by extensive studies in nuclear proliferation/nonproliferation as well as in-depth work on the possibilities of nuclear disarmament as illustrated by the work of John Perkovich and James Acton. Besides general initiatives like reducing regional rivalries and pursuing confidence-building, we know of definite measures that can be taken now to bring us closer to nuclear disarmament, for example, bringing into force the Comprehensive Test Ban Treaty, working toward a Fissile Material Cut-off Treaty, and a No First Use (of nuclear weapons) Pledge by the United States.[ss]

In 1959 at Basel, Oppenheimer had lamented that "there have been crucial moments in which the existence of a public philosophical discourse … could have made a great difference in the moral climate and human scope of our times." In many ways, Oppenheimer's concern is now being addressed. For example, in the interdisciplinary field of nuclear ethics, philosopher Thomas Doyle in his 2010 article "Reviving Nuclear Ethics: A Renewed Research Agenda for the Twenty-First Century" has proposed a research agenda for three areas: "the possible decay of the Nonproliferation Treaty (NPT) regime, the threat that nuclear weapons pose to democratic institutions, and the relationship between ethics and domestic political dimensions of nuclearization."[449]

At another level, William Walker, who is a professor of international relations at the University of St. Andrews, has moved morality into the arena of the international nuclear order and nuclear policy. In his 2007 article, "Nuclear Enlightenment and Counter-Enlightenment," he holds that "the exceptional nature of nuclear weapons calls for an exceptional kind of cooperative politics" and this requires the international nuclear order to fully incorporate "the NPT or an NPT-like vessel of central principles, norms, and rules." Key to

[ss]For an interesting discussion of things to be done in the short term for achieving a world free of nuclear weapons, see the final chapter in Richard Falk and David Krieger, *The Path to Zero: Dialogues on Nuclear Dangers*, (Boulder, CO: Paradigm Publishers, 2012).

this, of course, are the nuclear disarmament norm and its principle that "nuclear weapons are *intrinsically* illegitimate [a 'radical evil' due to their destructive power], and that any legitimacy or legality afforded to them has to be contingent and temporary."[450]

In his 2012 book, *A Perpetual Menace: Nuclear Weapons and International Order,* Walker continues and deepens the positions and views taken in his 2007 article.[tt] Walker mentions that his title *A Perpetual Menace* is taken from a July 1944 memorandum of Bohr to President Roosevelt warning him about the prospects of an atomic bomb for the international order, and in many ways Walker can be taken as "echoing Bohr [and Oppenheimer as well]."[451] Walker again emphasizes that the legality for a small group of states to possess nuclear weapons according to the NPT is simply a historical contingency, and that this legality is not legitimacy. Consequently, "For both moral and political reasons, therefore, the bracketing of legality and legitimacy within the NPT requires that the legal possessors [of nuclear weapons] commit themselves to the reversal of their acquisition — to the elimination of their nuclear weapons and nuclear weapons status."[452]

Walker notes that his moral stance here is in many ways Kantian — appealing to justice and fairness within a social and political structure as well as taking the nuclear disarmament norm as a "regulative principle" guiding action and not as "an ideal serving a utopian aim." In the concluding section of his book, he invokes the moral emotions in support of a normative international order.

> Scholars and practitioners often write and act as if questions of morality have no place in international politics. They are certainly mistaken in the field of nuclear weapons. For reasons discussed at various points in this book, the moral implications of the possession

[tt]Walker holds that something along the lines of the Acheson–Lilienthal initiative is needed in the international nuclear order, but this could be "elusive." For instance, he writes: "A founding document of the nuclear age, the Acheson–Lilienthal Report, bore the title 'A Proposal for the International Control of Atomic Energy'. That control and the order that is implied seem as essential but elusive today as in 1946." (Walker, *Perpetual Menace* (ref. 379), p. 193).

> and use of these instruments of annihilation are profound and have affected behavior throughout the nuclear age. Without underestimating the role played by nuclear deterrence, the absence of nuclear war since 1945 has its roots in the moral repugnance evoked by images of the wholesale destruction of people, cities, societies and living environments, and in recognition of the despair and shame that would follow it. Moral repugnance has been one of humankind's main protections against nuclear disaster. It has animated the searches for order and restraint that have been such features of nuclear history.[453]

Another way we have moved beyond the 1950s is that Oppenheimer's voice is essentially absent from the public sphere. A hope underlying this book has been to foster a sympathetic, though not uncritical, understanding of Oppenheimer and assist in bringing his voice back into the public sphere. Oppenheimer can serve as a historic voice, and not just as a symbolic figure, of someone strategically placed in the nuclear revolution to help us move forward to a more humane world. This voice would call for breaking the "grip" of the nation state with the means of specialized communities, speak of the communitarian nature of science as well as science as a cultural resource, and encourage us to our dual duty of great openness and faithfulness grounded in specialization.

Oppenheimer's voice would also raise the specter of nuclear proliferation and reiterate as it did in 1965 that to be successful we must "show, by our own example and conviction, that we regard nuclear armaments as a transitory, dangerous, and degrading phase of the world's history." Most important, this voice would echo the necessity of abolishing nuclear weapons along the lines of the Acheson–Lilienthal plan. This plan was in large part Oppenheimer's plan, and he spoke eloquently for it in 1946 and continually held that its arguments are "correct arguments" and that "Some day we will want to come back to this." In significant ways, we *have* come back. For one, the Acheson–Lilienthal plan and its arguments are in many ways instantiated in the Nuclear Nonproliferation Treaty with its three pillars — nonproliferation of nuclear weapons, peaceful use of nuclear energy, and nuclear disarmament — and guide its evolving structure.

This remarkable rise of the nuclear nonproliferation regime, along with recent calls for a world without nuclear weapons, correspondingly affect the retrospective assessment of Oppenheimer and the postwar attempts for the international control of atomic energy. They demonstrate that the failure of the Acheson–Lilienthal initiative was not intrinsic to project but extrinsic. Though it failed in the late 1940s, the Acheson–Lilienthal plan was not discredited and could "perhaps in the form of some new aspiration, contribute to making sense of what is left." Oppenheimer's hope and vision of 1957–59 can be taken as such an attempt. In a significant way, this book has argued that this later hope and vision, really an aspiration for a world of cultural coherence and a world without war, is philosophically grounded and can be successfully placed into a narrative structure using international relations theory that has relevance today. This is critical to how we view Oppenheimer and his thought, and possibly how Oppenheimer hoped to view himself.

Not unexpectedly, the world has moved beyond 1950s in terms of new crises and global challenges.[uuu] Like the atomic crisis of 1945, the environmental crisis of today with the prospect of global warming will require a universalistic approach that reaches beyond the Leviathan state. However, the challenges surrounding global warming are enormous and measures for addressing them are so limited at this time, that for many, things appear hopeless.[vv] By comparison, the

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[uuu]For a discussion of the new crises and global challenges of the 21st Century, see especially pp. 350–353 in G. John Ikenberry, *Liberal Leviathan: The Origins, Crisis, and Transformation of the American World Order* (Princeton: Princeton University Press, 2011). Inkenberry's book is a masterful and systematic account in the tradition of liberal internationalism written for international relations theorists, scholars, policymakers, and the general public.

[vv]The literature on global warming and its challenges is extensive. I have found the Stephen M. Gardiner, *A Perfect Moral Storm: The Ethical Tragedy of Climate Change* (Oxford: Oxford University Press, 2011) to be very helpful. Also, for an in-depth account of how certain scientists (in particular, the solid-state physicist Fredrick Seitz who did war-related research during WWII and was president of the National Academy of Sciences from 1962 to 1969) have "joined forces with think tanks and private corporations to challenge scientific evidence on a host of contemporary issues" (p. 6) and "deliberately misrepresent the work of their own colleagues" (p. 8), see

challenges facing the nuclear problem, though substantial, appear more manageable than those facing global warming. Moving ahead on nuclear disarmament today would assist in confronting and solving global warming by showing success in an area that also requires a global solution. Additionally, there is the promising coincidence that nuclear power does not contribute greenhouse gases and hence its widespread use could be a significant factor in confronting global warming.[ww] Remember that in November 1945 at Los Alamos, Oppenheimer spoke of atomic energy as "a new field, in which just the novelty and the special characteristics of the technical operations should enable one to establish a community of interest which might almost be regarded as a pilot plant for a new type of international collaboration." Therefore, if we solve the nuclear problem, we should have a "pilot plant" for solving other global problems as well.

Finally, many historians today take the Cold War as an "Ideological Project" (i.e., a war of ideas) which is symbolized in the West by the Congress for Cultural Freedom and its CIA funding. Oppenheimer was a member of the CCF; and some of his ideas can be portrayed as part of this project, but his hope and vision were certainly more. They were a response not only to the nuclear revolution but to modernity itself. His views of science as a model of responsible belief embedded in community and cooperation, along with his liberal internationalism, are needed in this time of competition and fragmentation. His ideas are more than suggestive since they point us in the right direction and provide means for moving forward and beyond the Leviathan state. In some ways, as physicists might say, his hope and vision provides a "first-order solution" for modernity and its various crises, especially the nuclear crisis and the resulting call for a world free of

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Naomi Oreskes and Erik M. Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming* (New York: Bloomsbury Press, 2010).

[ww] For an up-to-date case for the need of nuclear power to confront global warming, see Michael H. Fox, *Why We Need Nuclear Power — The Environmental Case* (Oxford: Oxford University Press, 2014). Fox characterizes himself as a "pro-nuclear environmentalist" and argues for halting "global warming by replacing most fossil fuel electrical generation with nuclear power, supplemented with wind power." (p. 281).

nuclear weapons. In the words of Rorty's challenge, Oppenheimer's ideas and outlook can assist us in constructing a plausible large scale narrative of progress.

Oppenheimer's hope and vision of 1957–59 arose from his "having played an active part" in bringing about the nuclear revolution and his taking responsibility for "what came of this revolution." In August 1965, twenty years after Hiroshima, in an interview for the CBS Evening News with Walter Cronkite, Oppenheimer responded to the query that "from all that you have said, it seems when you contemplate the future, it is more with hope than with pessimism." Oppenheimer replied with words of hope and vision,

> I've tried to talk about the hopeful things …. There are a hundred reasons for seeing no hope at all. And I take it for granted that everybody can think of them without being reminded. It's harder to think of them on the other side, and I have tried to say that however frail and however tentative, however limited, they do exist and they look to me like a bridge head to a liveable future.[454]

Endnotes

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23. Pais (and Crease), *J. Robert Oppenheimer: A Life* (ref. 19), pp. xx–xxi.
24. *Ibid*., p. 306.
25. Monk, *Inside the Centre* (ref. 13) p. 336.
26. Quoted in Pais (and Crease), *J. Robert Oppenheimer: A Life* (ref. 19), p. 23.
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32. Quoted in Bird and Sherwin, *American Prometheus* (ref. 2), p. 375.
33. Robert P. Crease, "Oppenheimer and the Sense of the Tragic" in Cathryn Carson and David A. Hollinger (editors), *Reappraising Oppenheimer: Centennial Studies and Reflections* (Berkeley: Office for History of Science and Technology, University of California-Berkeley, 2005), p. 321.
34. Bird and Sherwin, *American Prometheus* (ref. 2), p. 422.
35. *Ibid*., p. 429.
36. Cassidy, *Oppenheimer and the American Century* (ref. 5), p. 311.
37. *Ibid*., pp. 311–312.
38. *In the Matter of J. Robert Oppenheimer* (ref. 16), p. 22.
39. Bird and Sherwin, *American Prometheus* (ref. 2), p. 549. Used by permission of Alfred A. Knopf, an imprint of the Knopf Doubleday

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40. *Ibid.*, p. 550.
41. *Ibid.*, p. 547.
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    Cathryn Carson and David A. Hollinger (editors), *Reappraising Oppenheimer: Centennial Studies and Reflections* (Berkeley: Office for History of Science and Technology, University of California-Berkeley, 2005) is the collection of essays from the 2004 Oppenheimer Centennial Conference at Berkeley. Cynthia C. Kelly (editor), *Oppenheimer and the Manhattan Project* (Singapore: World Scientific Publishing, 2006) is the collection of essays from the 2004 Symposium on Oppenheimer at Los Alamos sponsored by the Atomic Heritage Foundation. Two recent articles on Oppenheimer are David K. Hecht, "The Atomic Hero: Robert Oppenheimer and the Making of Scientific Icons in the Early Cold War," *Technology and Culture* **49** (October 2008), pp. 943–966 and Michael A. Day, "Oppenheimer and Rabi: American Cold War Physicists as Public Intellectuals" in *The Atomic Bomb and American Society: New Perspectives* (Knoxville, TN: University of Tennessee Press, 2009), pp. 307–328. The journal *Metascience* (2008) devoted a 37-page review symposium to Thorpe's

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114. Oppenheimer, "Physics in the Contemporary World" (ref. 64), pp. 91–94.
115. J. R. Oppenheimer, "The Age of Science 1900–1950," *Scientific American* (September 1950), p. 23.
116. Oppenheimer, *Science and the Common Understanding* (ref. 63), p. 109.

117. *Ibid.*, pp. 103–104.
118. Letter MacLeish to Oppenheimer (June 21, 1953), Box 49, *JRO Papers* (ref. 55). The last quote comes from the following two lines in the poem.

> Why should she? Her devotion is to tell
> By rote her rosary of perfect answers:

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123. *Ibid.*, p. 97.
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